Resuscitation Council UK

GUIDELINES 2025

Adult basic life support in community settings

Maintain personal safety

Unresponsive?

↓

Shout/call for help

↓

Call 999 and ask for ambulance service

↓

Absent/abnormal breathing?

↓

30 chest compressions followed by 2 rescue breaths

↓

If the ambulance dispatcher identifies a local Automated External Defibrillator (AED) send someone else to fetch it

↓

Continue CPR 30:2

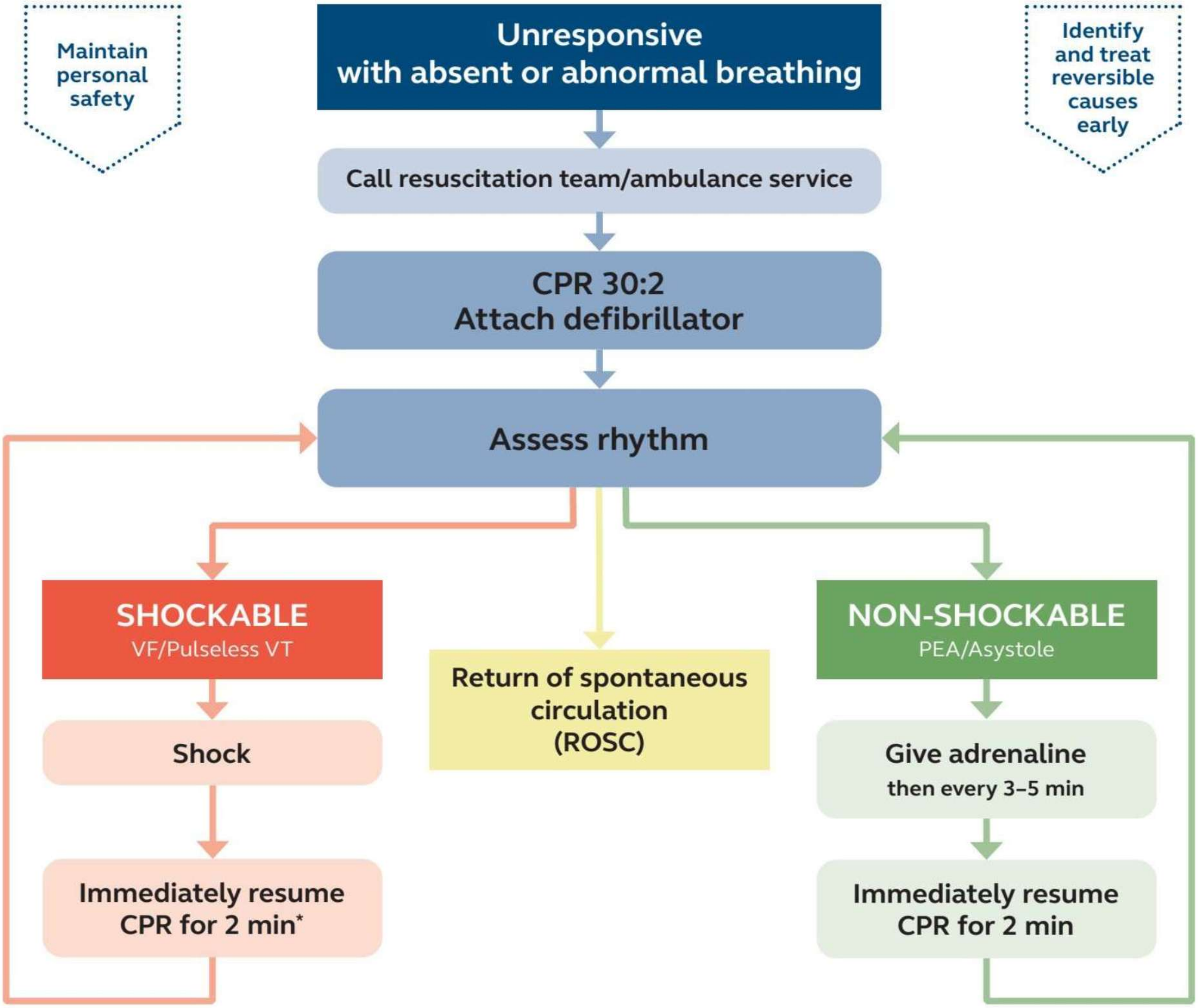
↓

As soon as AED arrives switch it on and follow instructions

↓

Continue CPR until the ambulance service arrives

Adult advanced life support



Maintain personal safety

Unresponsive with absent or abnormal breathing

Call resuscitation team/ambulance service

CPR 30:2
Attach defibrillator

Assess rhythm

SHOCKABLE
VF/Pulseless VT

Shock

Immediately resume CPR for 2 min*

Return of spontaneous circulation (ROSC)

NON-SHOCKABLE
PEA/Asystole

Give adrenaline
then every 3–5 min

Immediately resume CPR for 2 min

Identify and treat reversible causes early

High-quality chest compressions and ventilations, and:

- Ensure optimal defibrillator pad placement
- Give oxygen
- Continuous compressions if tracheal tube or SGA
- Use waveform capnography
- Minimise interruptions to chest compressions
- Early IV access (IO if IV not possible)

* Give 1st adrenaline after 3 shocks, then every 3–5 minutes

* Give amiodarone after 3 shocks

Reversible causes:

- Hypoxia
- Hypovolaemia
- Hyper-hypokalaemia, -calcaemia, -magnesaemia, hypoglycaemia (metabolic)
- Hypo-hyperthermia
- Thrombosis (coronary/pulmonary)
- Tension pneumothorax
- Toxins
- Tamponade (cardiac)

Consider:

- Changing pads to antero-posterior after 3 shocks
- Mechanical chest compressions to facilitate transfer/treatment
- Ultrasound to identify reversible causes
- Extracorporeal CPR and/or coronary angiography/PCI

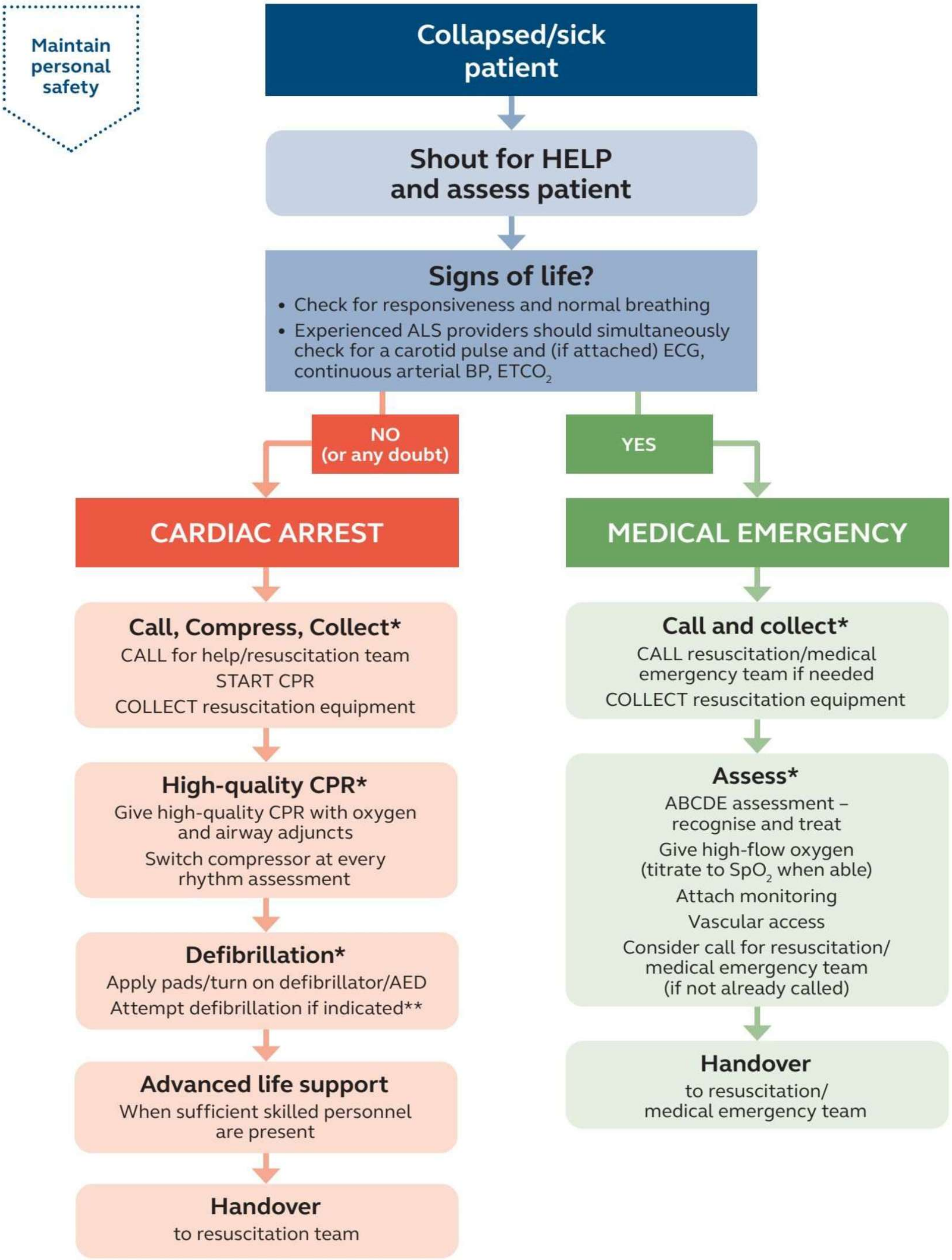
Immediately after ROSC:

- ABCDE assessment
- Aim SpO_2 94–98% and normal $PaCO_2$
- SBP > 100 mmHg
- 12-lead ECG
- Identify and treat cause
- Temperature control

Resuscitation Council UK

GUIDELINES 2025

Adult in-hospital resuscitation



Maintain personal safety

Collapsed/sick patient

Shout for HELP and assess patient

Signs of life?
- Check for responsiveness and normal breathing
- Experienced ALS providers should simultaneously check for a carotid pulse and (if attached) ECG, continuous arterial BP, $ETCO_2$

NO (or any doubt)

CARDIAC ARREST

Call, Compress, Collect*
CALL for help/resuscitation team
START CPR
COLLECT resuscitation equipment

High-quality CPR*
Give high-quality CPR with oxygen and airway adjuncts
Switch compressor at every rhythm assessment

Defibrillation*
Apply pads/turn on defibrillator/AED
Attempt defibrillation if indicated**

Advanced life support
When sufficient skilled personnel are present

Handover
to resuscitation team

YES

MEDICAL EMERGENCY

Call and collect*
CALL resuscitation/medical emergency team if needed
COLLECT resuscitation equipment

Assess*
ABCDE assessment – recognise and treat
Give high-flow oxygen (titrate to SpO_2 when able)
Attach monitoring
Vascular access
Consider call for resuscitation/medical emergency team (if not already called)

Handover
to resuscitation/medical emergency team

* Undertake actions concurrently if sufficient staff available
** Use a manual defibrillator if trained and device available

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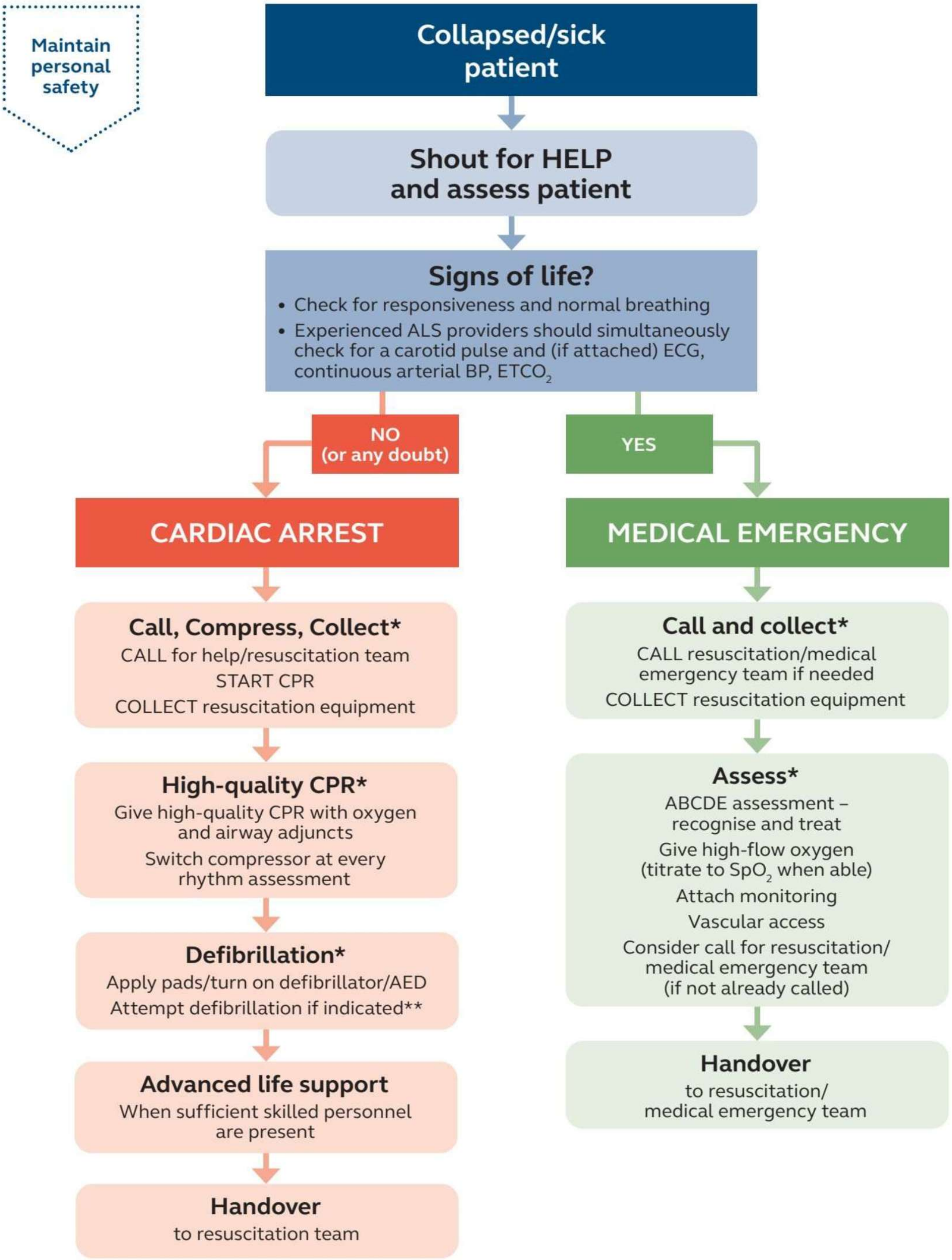
GUIDELINES 2025

Adult in-hospital resuscitation



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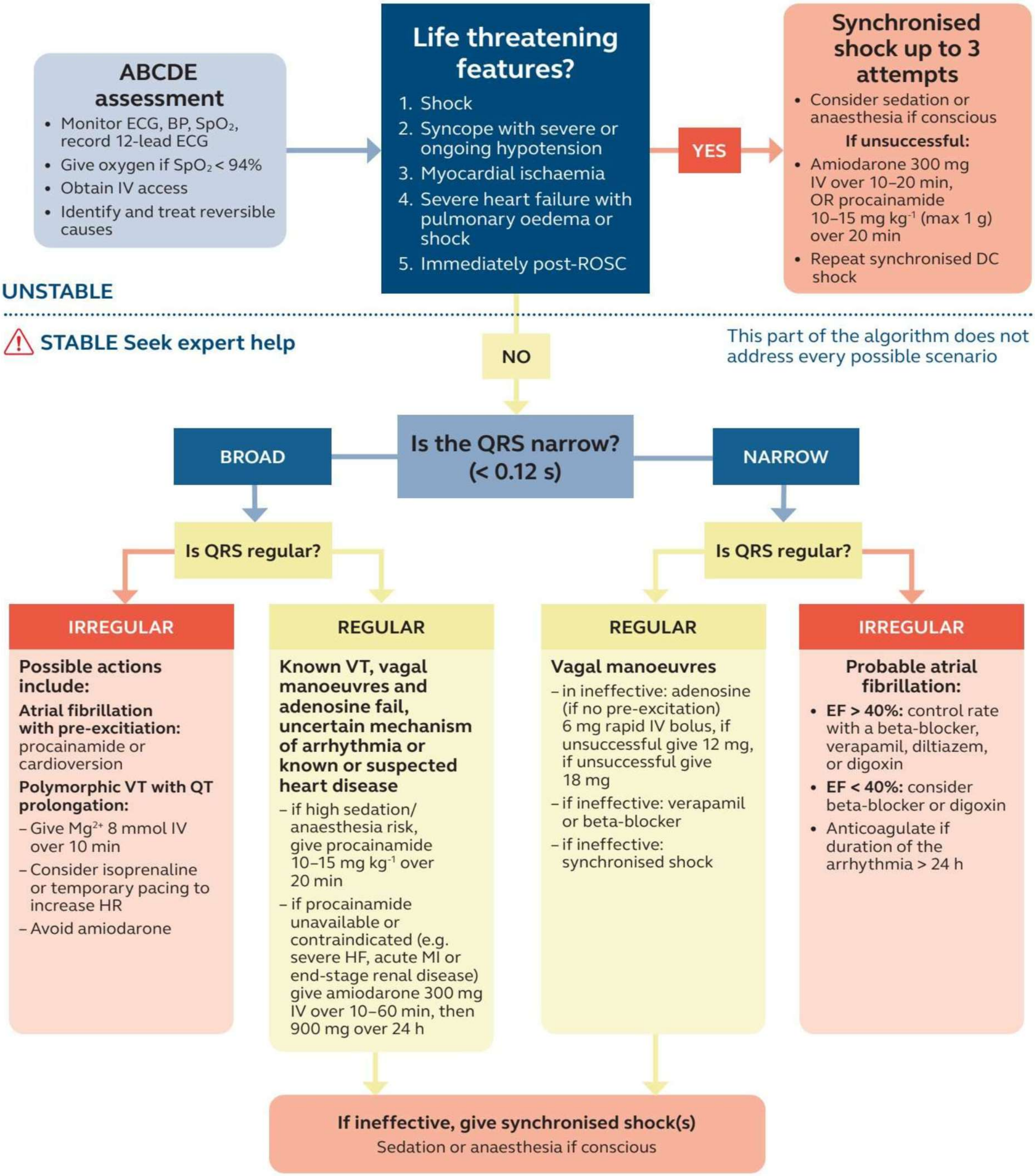
Adult tachyarrhythmia



ABCDE assessment
- Monitor ECG, BP, SpO_2, record 12-lead ECG
- Give oxygen if $SpO_2 < 94\%$
- Obtain IV access
- Identify and treat reversible causes

Life threatening features?
1. Shock
2. Syncope with severe or ongoing hypotension
3. Myocardial ischaemia
4. Severe heart failure with pulmonary oedema or shock
5. Immediately post-ROSC

YES

Synchronised shock up to 3 attempts
- Consider sedation or anaesthesia if conscious

If unsuccessful:
- Amiodarone 300 mg IV over 10–20 min, OR procainamide 10–15 mg kg^{-1} (max 1 g) over 20 min
- Repeat synchronised DC shock

UNSTABLE

STABLE Seek expert help

This part of the algorithm does not address every possible scenario

NO

Is the QRS narrow? (< 0.12 s)

BROAD

Is QRS regular?

IRREGULAR

Possible actions include:

Atrial fibrillation with pre-excitation: procainamide or cardioversion

Polymorphic VT with QT prolongation:
- Give Mg^{2+} 8 mmol IV over 10 min
- Consider isoprenaline or temporary pacing to increase HR
- Avoid amiodarone

REGULAR

Known VT, vagal manoeuvres and adenosine fail, uncertain mechanism of arrhythmia or known or suspected heart disease
- if high sedation/anaesthesia risk, give procainamide 10–15 mg kg^{-1} over 20 min
- if procainamide unavailable or contraindicated (e.g. severe HF, acute MI or end-stage renal disease) give amiodarone 300 mg IV over 10–60 min, then 900 mg over 24 h

NARROW

Is QRS regular?

REGULAR

Vagal manoeuvres
- in ineffective: adenosine (if no pre-excitation) 6 mg rapid IV bolus, if unsuccessful give 12 mg, if unsuccessful give 18 mg
- if ineffective: verapamil or beta-blocker
- if ineffective: synchronised shock

IRREGULAR

Probable atrial fibrillation:
- **EF > 40%:** control rate with a beta-blocker, verapamil, diltiazem, or digoxin
- **EF < 40%:** consider beta-blocker or digoxin
- Anticoagulate if duration of the arrhythmia > 24 h

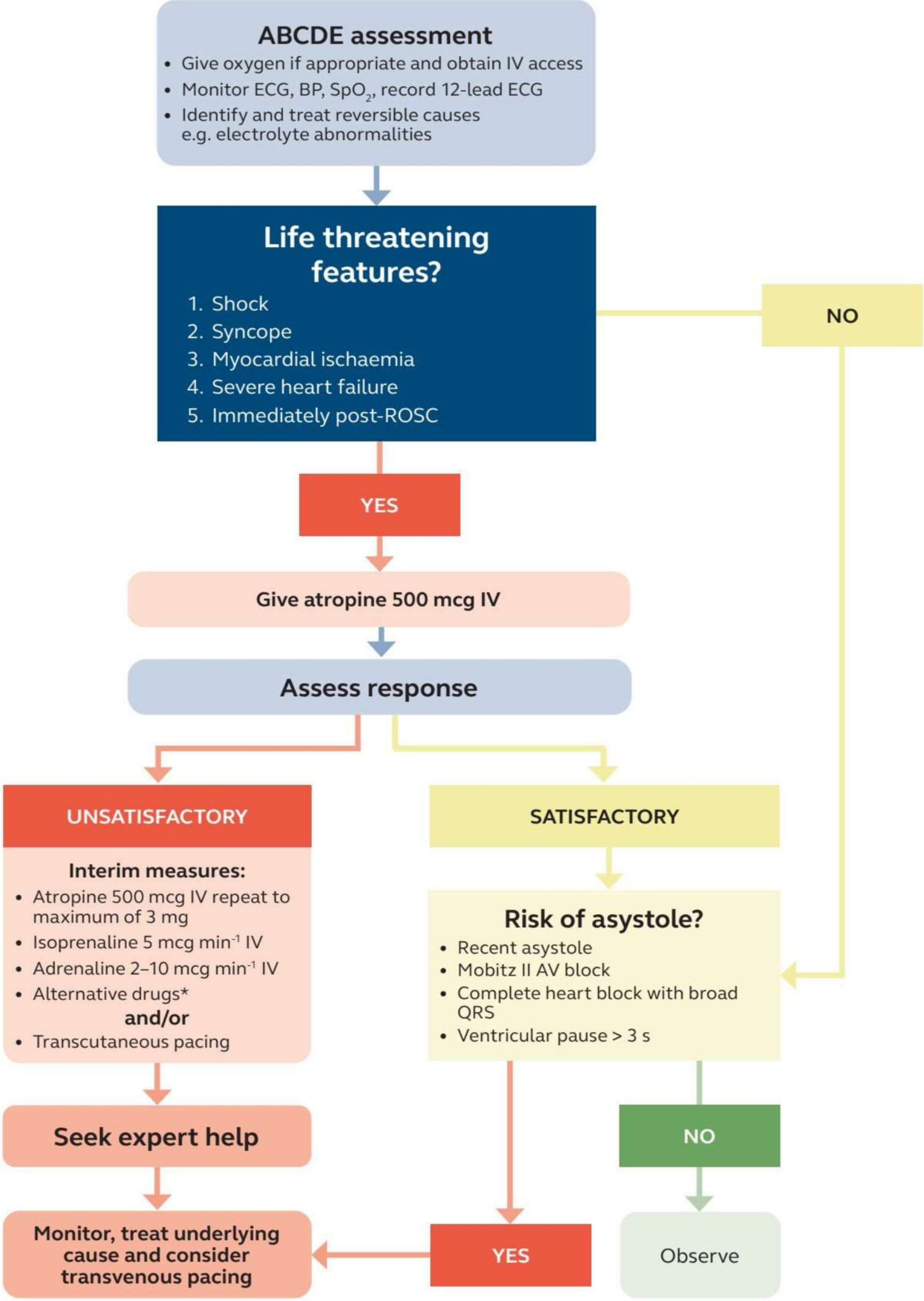
If ineffective, give synchronised shock(s)

Sedation or anaesthesia if conscious

This algorithm is for peri-arrest tachyarrhythmia of abnormal origin, it is not for sinus tachycardia where the underlying cause should be treated; in sinus tachycardia do not try to normalise the heart rate with antiarrhythmic medication or synchronised cardioversion.

Seek expert help if the tachyarrhythmia and/or life-threatening features persist.

Adult bradyarrhythmia



ABCDE assessment
- Give oxygen if appropriate and obtain IV access
- Monitor ECG, BP, SpO_2, record 12-lead ECG
- Identify and treat reversible causes e.g. electrolyte abnormalities

Life threatening features?
1. Shock
2. Syncope
3. Myocardial ischaemia
4. Severe heart failure
5. Immediately post-ROSC

YES

Give atropine 500 mcg IV

Assess response

UNSATISFACTORY

Interim measures:
- Atropine 500 mcg IV repeat to maximum of 3 mg
- Isoprenaline 5 mcg min^{-1} IV
- Adrenaline 2–10 mcg min^{-1} IV
- Alternative drugs*

and/or
- Transcutaneous pacing

Seek expert help

Monitor, treat underlying cause and consider transvenous pacing

NO

SATISFACTORY

Risk of asystole?
- Recent asystole
- Mobitz II AV block
- Complete heart block with broad QRS
- Ventricular pause > 3 s

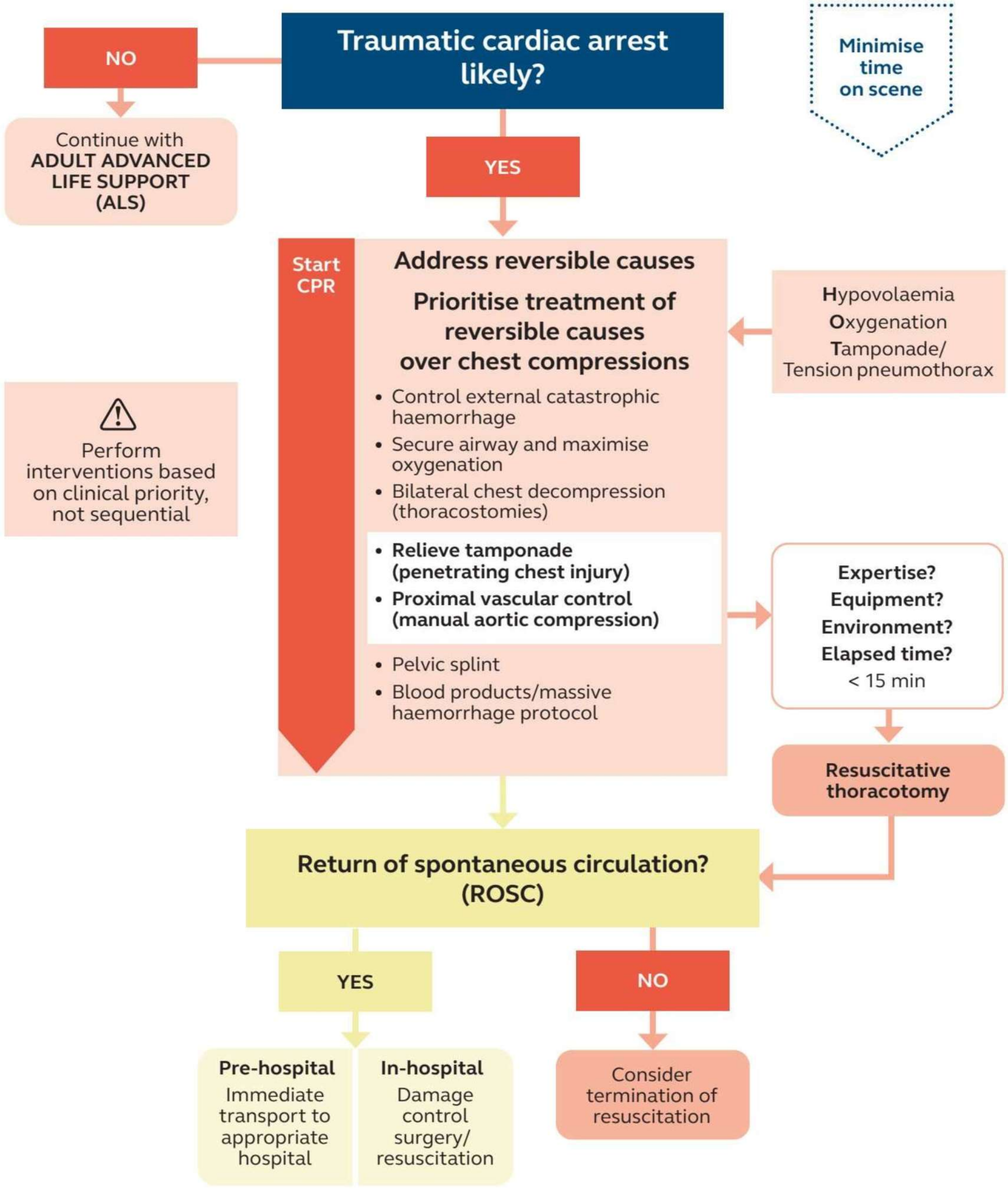
YES

NO

Observe

*** Alternatives include:**
- Aminophylline
- Dopamine
- Glucagon (if beta-blocker or calcium channel blocker overdose)
- Glycopyrrolate can be used instead of atropine

Adult traumatic cardiac arrest/peri-arrest



Traumatic cardiac arrest likely?

NO

Continue with **ADULT ADVANCED LIFE SUPPORT (ALS)**

YES

Minimise time on scene

Start CPR

Address reversible causes

Prioritise treatment of reversible causes over chest compressions

- Control external catastrophic haemorrhage
- Secure airway and maximise oxygenation
- Bilateral chest decompression (thoracostomies)
- **Relieve tamponade (penetrating chest injury)**
- **Proximal vascular control (manual aortic compression)**
- Pelvic splint
- Blood products/massive haemorrhage protocol

Hypovolaemia
Oxygenation
Tamponade/
Tension pneumothorax

⚠ Perform interventions based on clinical priority, not sequential

Expertise?
Equipment?
Environment?
Elapsed time?
< 15 min

Resuscitative thoracotomy

Return of spontaneous circulation? (ROSC)

YES

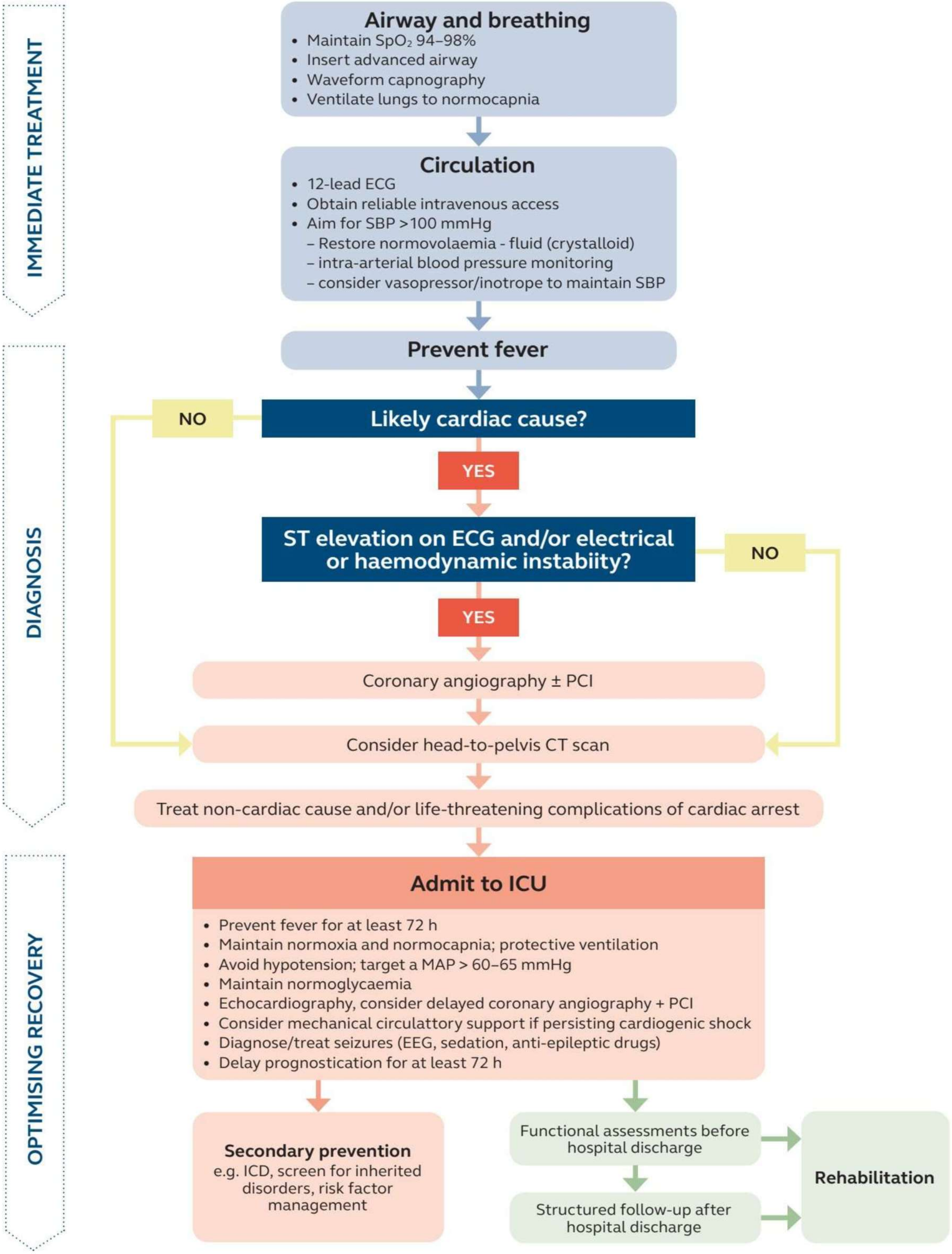
Pre-hospital
Immediate transport to appropriate hospital

In-hospital
Damage control surgery/ resuscitation

NO

Consider termination of resuscitation

Adult post-resuscitation care



IMMEDIATE TREATMENT

Airway and breathing
- Maintain SpO$_2$ 94–98%
- Insert advanced airway
- Waveform capnography
- Ventilate lungs to normocapnia

Circulation
- 12-lead ECG
- Obtain reliable intravenous access
- Aim for SBP >100 mmHg
  - – Restore normovolaemia - fluid (crystalloid)
  - – intra-arterial blood pressure monitoring
  - – consider vasopressor/inotrope to maintain SBP

Prevent fever

DIAGNOSIS

Likely cardiac cause?

NO → Consider head-to-pelvis CT scan

YES

ST elevation on ECG and/or electrical or haemodynamic instabiity?

NO → Consider head-to-pelvis CT scan

YES

Coronary angiography ± PCI

Consider head-to-pelvis CT scan

Treat non-cardiac cause and/or life-threatening complications of cardiac arrest

OPTIMISING RECOVERY

Admit to ICU
- Prevent fever for at least 72 h
- Maintain normoxia and normocapnia; protective ventilation
- Avoid hypotension; target a MAP > 60–65 mmHg
- Maintain normoglycaemia
- Echocardiography, consider delayed coronary angiography + PCI
- Consider mechanical circulattory support if persisting cardiogenic shock
- Diagnose/treat seizures (EEG, sedation, anti-epileptic drugs)
- Delay prognostication for at least 72 h

Secondary prevention
e.g. ICD, screen for inherited disorders, risk factor management

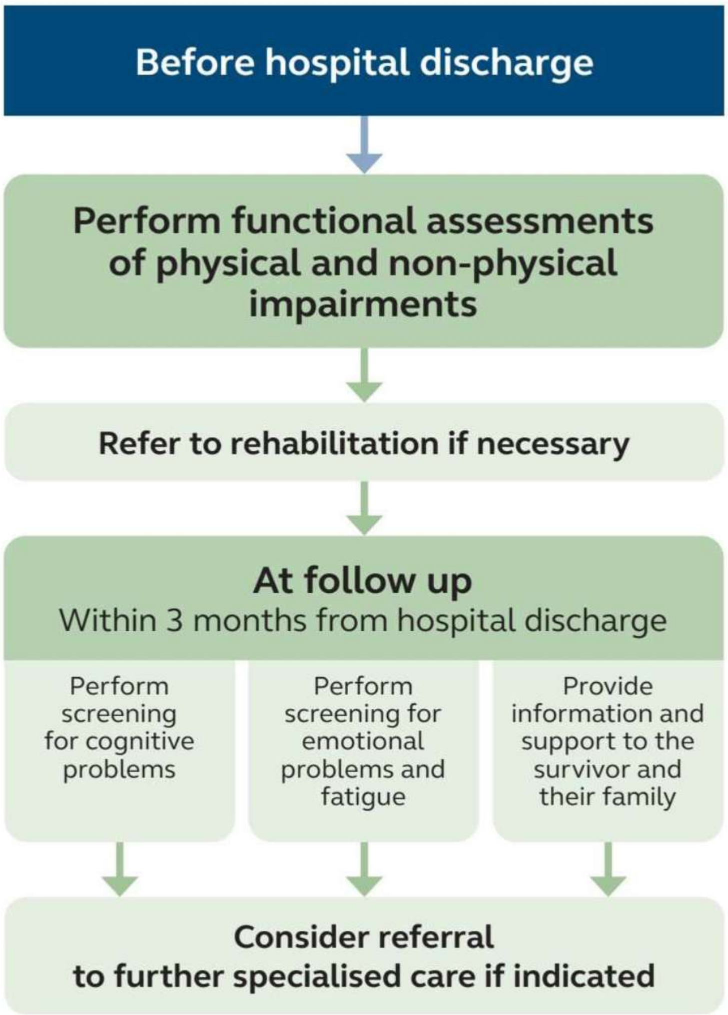
Functional assessments before hospital discharge

Structured follow-up after hospital discharge

Rehabilitation

Post-resuscitation care algorithm – **SBP** systolic blood pressure, **PCI** percutaneous coronary intervention, **ICU** Intensive care unit, **MAP** mean arterial pressure, **EEG** electroencephalography, **ICD** implanted cardioverter defibrillator

Adult post-cardiac arrest functional assessments, follow-up and rehabilitation



Before hospital discharge

Perform functional assessments of physical and non-physical impairments

Refer to rehabilitation if necessary

At follow up
Within 3 months from hospital discharge

- Perform screening for cognitive problems
- Perform screening for emotional problems and fatigue
- Provide information and support to the survivor and their family

Consider referral to further specialised care if indicated

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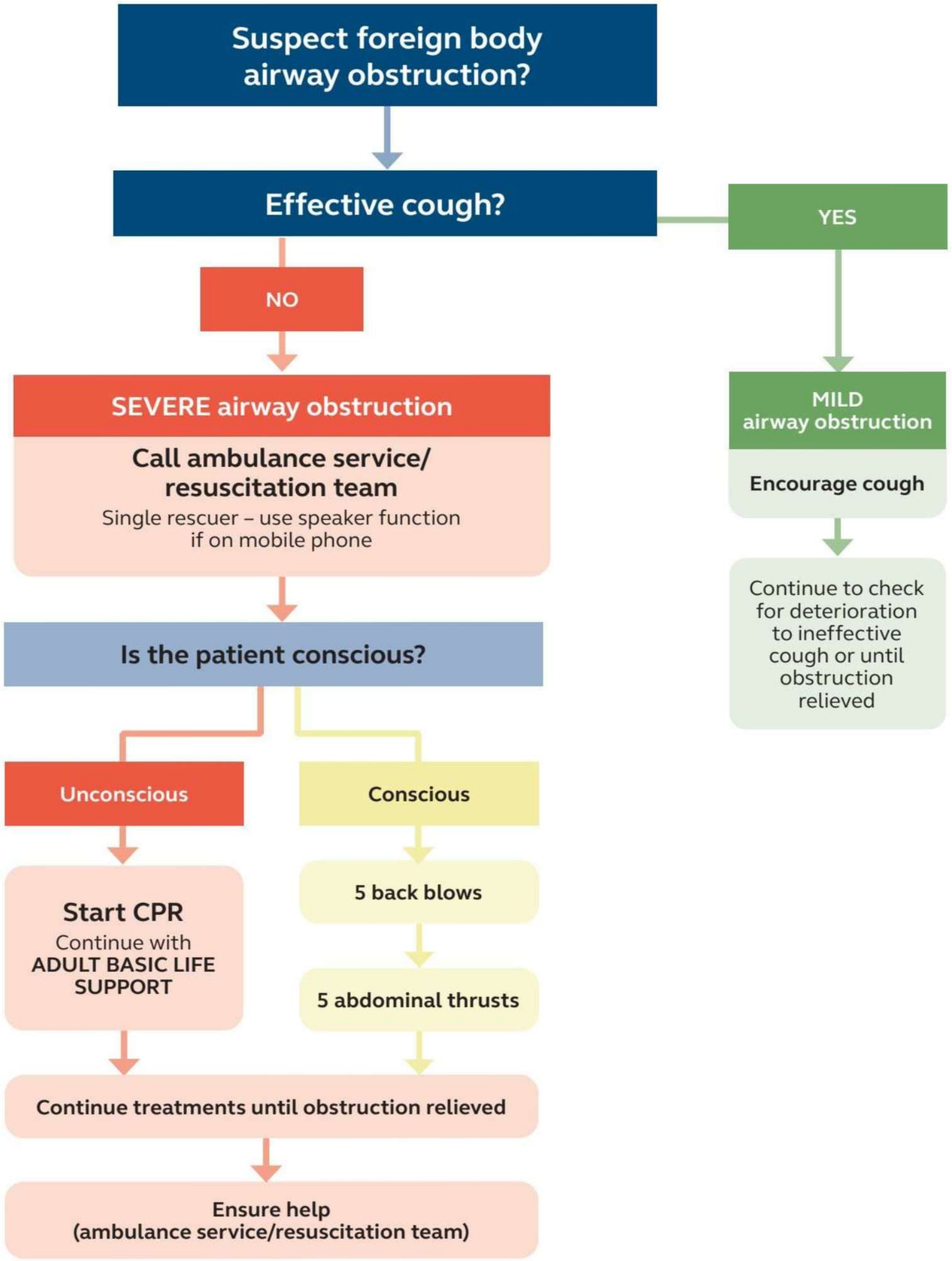
Adult choking



Suspect foreign body airway obstruction?

Effective cough?

YES

MILD airway obstruction

Encourage cough

Continue to check for deterioration to ineffective cough or until obstruction relieved

NO

SEVERE airway obstruction

Call ambulance service/ resuscitation team

Single rescuer – use speaker function if on mobile phone

Is the patient conscious?

Unconscious

Start CPR

Continue with **ADULT BASIC LIFE SUPPORT**

Conscious

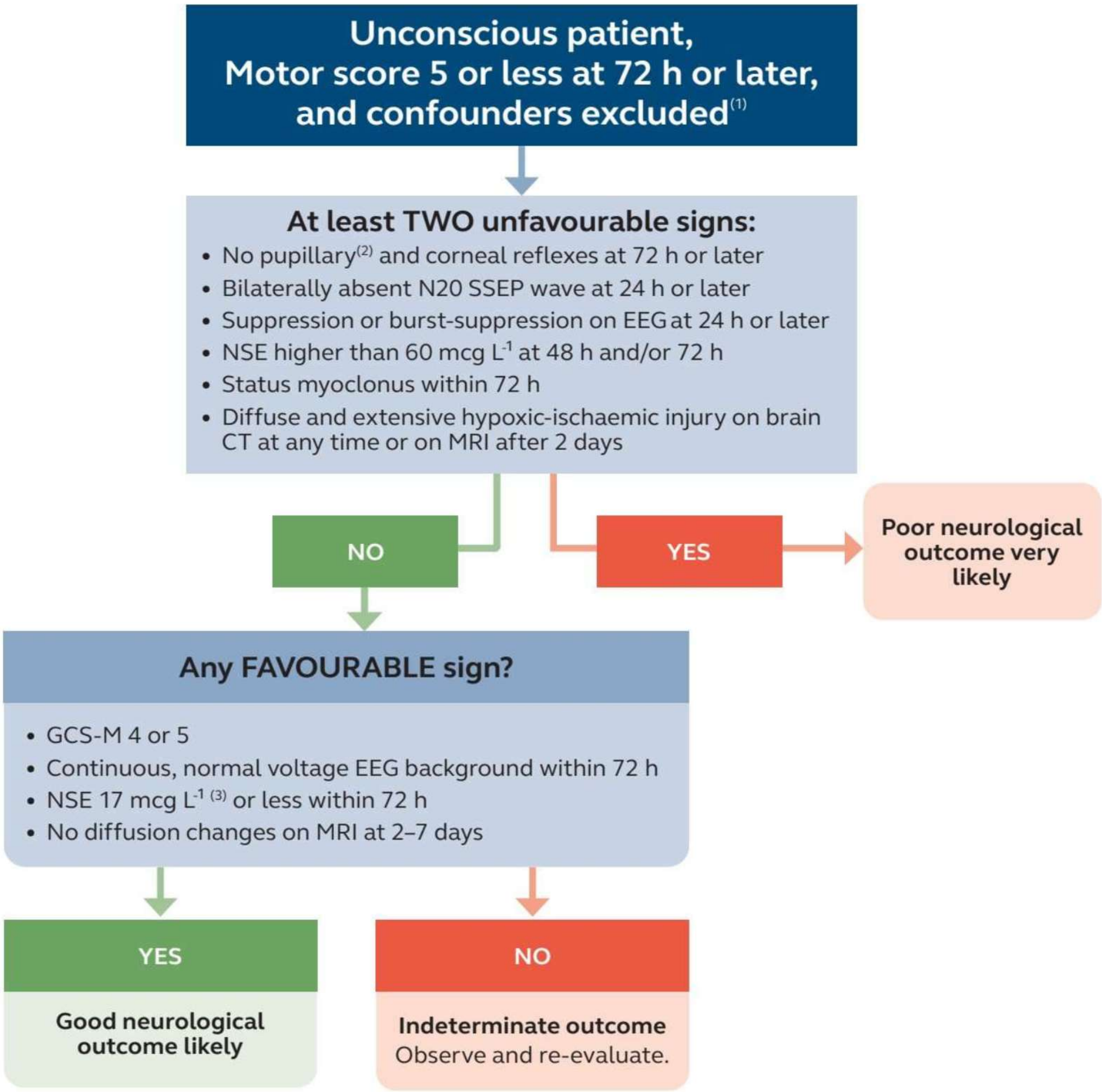
5 back blows

5 abdominal thrusts

Continue treatments until obstruction relieved

Ensure help (ambulance service/resuscitation team)

Neuroprognostication of the comatose adult patient after resuscitation from cardiac arrest



Unconscious patient, Motor score 5 or less at 72 h or later, and confounders excluded(1)

At least TWO unfavourable signs:

- No pupillary(2) and corneal reflexes at 72 h or later
- Bilaterally absent N20 SSEP wave at 24 h or later
- Suppression or burst-suppression on EEG at 24 h or later
- NSE higher than 60 mcg L^{-1} at 48 h and/or 72 h
- Status myoclonus within 72 h
- Diffuse and extensive hypoxic-ischaemic injury on brain CT at any time or on MRI after 2 days

YES → **Poor neurological outcome very likely**

NO ↓

Any FAVOURABLE sign?

- GCS-M 4 or 5
- Continuous, normal voltage EEG background within 72 h
- NSE 17 mcg L^{-1} (3) or less within 72 h
- No diffusion changes on MRI at 2–7 days

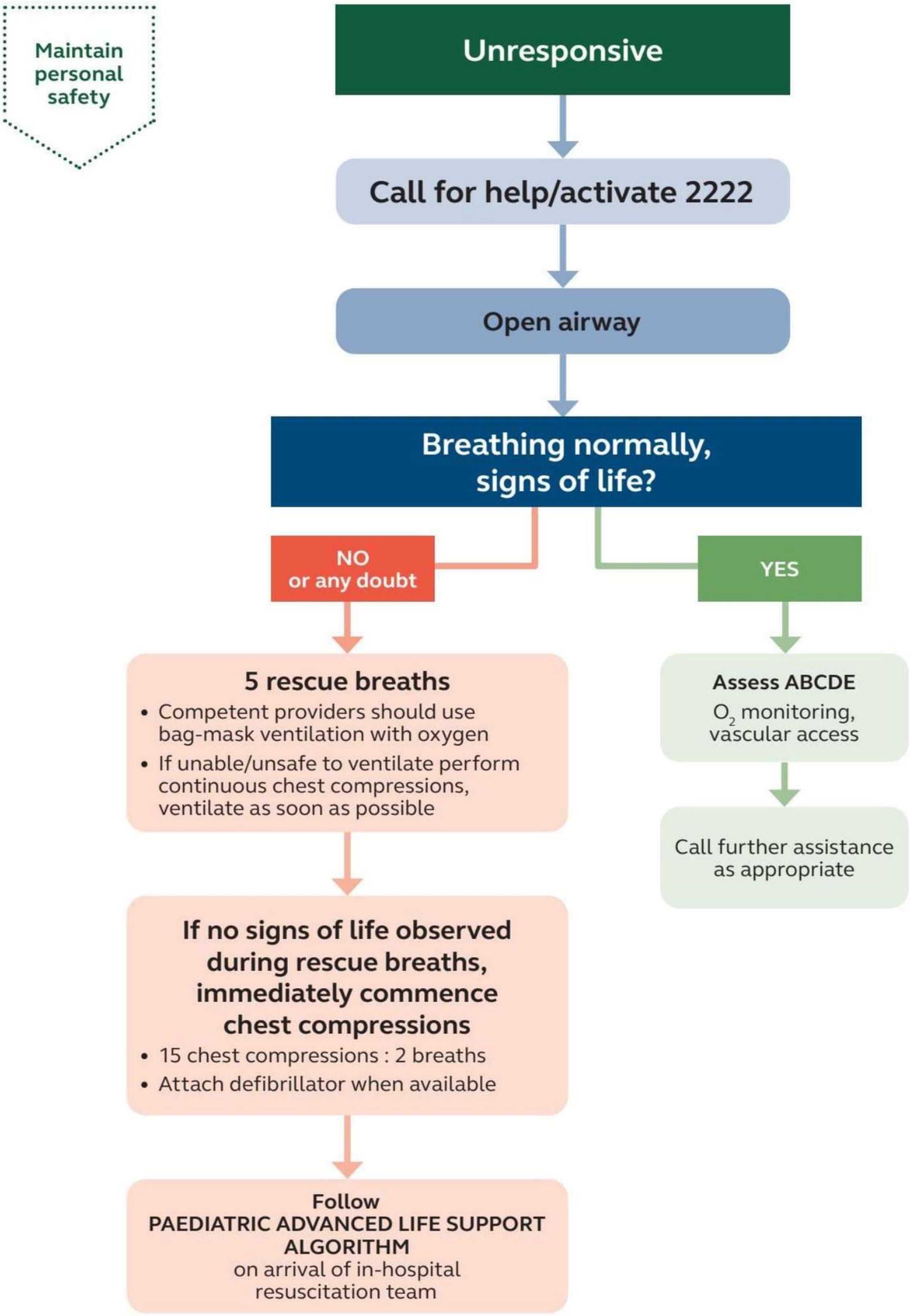
YES → **Good neurological outcome likely**

NO → **Indeterminate outcome**
Observe and re-evaluate.

---

1. Major confounders may include analgo-sedation, neuromuscular blockade, hypothermia, severe hypotension, hypoglycemia, sepsis, and metabolic and respiratory derangements.
2. Use a pupillometer, when available, to determine if the pupillary light reflex is absent.
3. Perform serial NSE samples at 24, 48, and 72 h after ROSC to detect NSE trends and minimise confounding from occasional haemolysis. Increasing NSE values between 24-48 h or 24/48 h and 72 h further support a likely poor outcome.

Paediatric basic life support



Maintain personal safety

Unresponsive

Call for help/activate 2222

Open airway

Breathing normally, signs of life?

NO or any doubt

5 rescue breaths

- Competent providers should use bag-mask ventilation with oxygen
- If unable/unsafe to ventilate perform continuous chest compressions, ventilate as soon as possible

If no signs of life observed during rescue breaths, immediately commence chest compressions

- 15 chest compressions : 2 breaths
- Attach defibrillator when available

Follow
PAEDIATRIC ADVANCED LIFE SUPPORT ALGORITHM
on arrival of in-hospital resuscitation team

YES

Assess ABCDE
O_2 monitoring, vascular access

Call further assistance as appropriate

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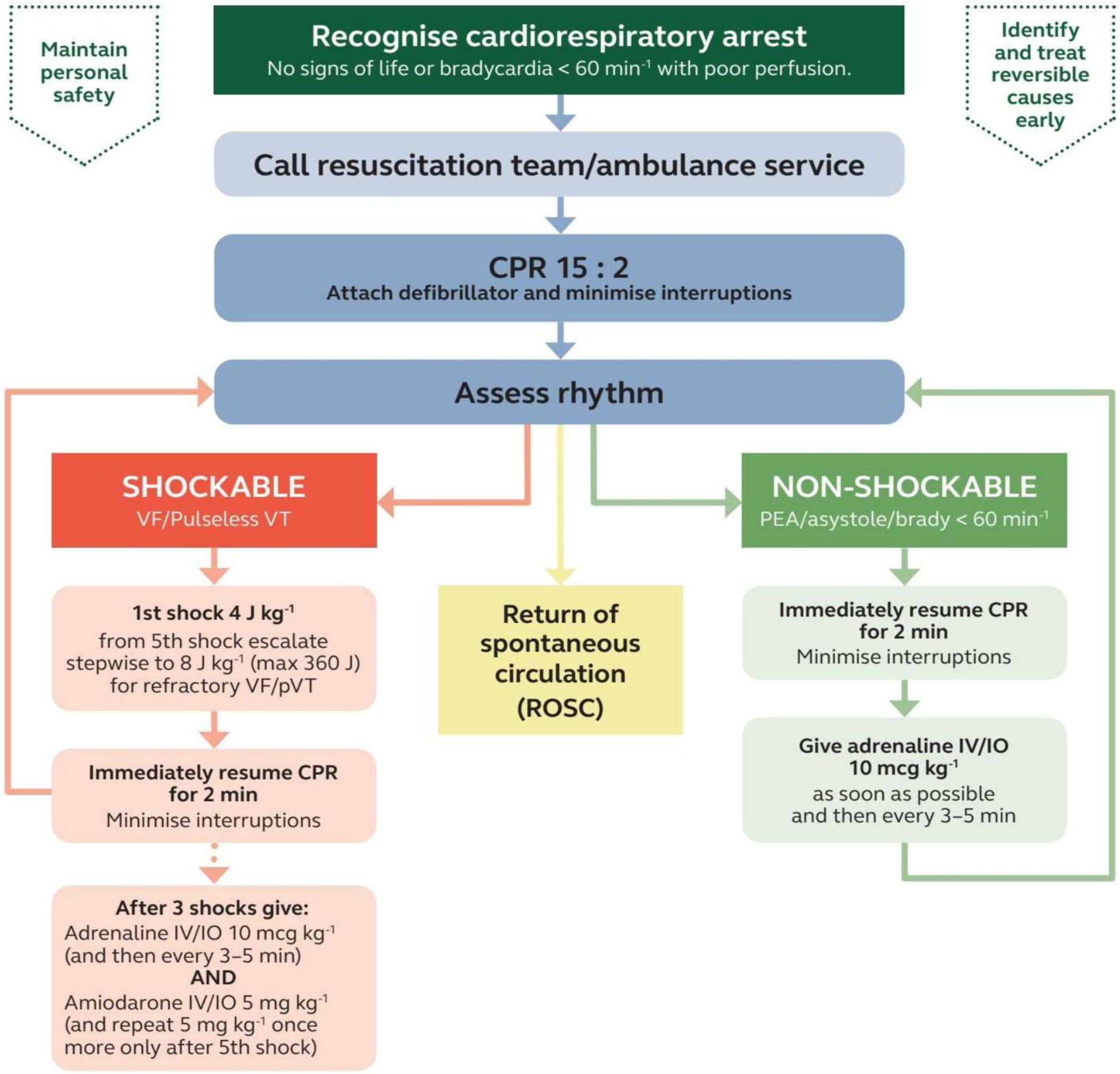
Paediatric advanced life support



Maintain personal safety

Identify and treat reversible causes early

Recognise cardiorespiratory arrest
No signs of life or bradycardia < 60 min^{-1} with poor perfusion.

Call resuscitation team/ambulance service

CPR 15 : 2
Attach defibrillator and minimise interruptions

Assess rhythm

SHOCKABLE
VF/Pulseless VT

1st shock 4 J kg^{-1}
from 5th shock escalate stepwise to 8 J kg^{-1} (max 360 J) for refractory VF/pVT

Immediately resume CPR for 2 min
Minimise interruptions

After 3 shocks give:
Adrenaline IV/IO 10 mcg kg^{-1} (and then every 3–5 min)
AND
Amiodarone IV/IO 5 mg kg^{-1} (and repeat 5 mg kg^{-1} once more only after 5th shock)

Return of spontaneous circulation (ROSC)

NON-SHOCKABLE
PEA/asystole/brady < 60 min^{-1}

Immediately resume CPR for 2 min
Minimise interruptions

Give adrenaline IV/IO 10 mcg kg^{-1}
as soon as possible and then every 3–5 min

High-quality chest compressions and:

- Ensure correct rate, depth and full recoil
- Provide BMV with 100% oxygen (2 person approach)
- Continuous compressions if tracheal tube or SGA inserted
- Use waveform capnography and ventilate at a rate (breaths minute^{-1}) of:

Infants	1–8 years	8–12 years	> 12 years
25	20	15	10

- Vascular access IV/IO
- Once started, give adrenaline every 3–5 min
- Maximum single dose adrenaline 1 mg
- Maximum single dose amiodarone 300 mg after the 3rd shock and 150 mg after the 5th shock

Reversible causes:

- Hypoxia
- Hypovolaemia
- Hyper-hypokalaemia, -calcaemia, -magnesaemia, hypoglycaemia (metabolic)
- Hypo-hyperthermia
- Thrombosis (coronary/ pulmonary)
- Tension pneumothorax
- Tamponade (cardiac)
- Toxins

Immediately after ROSC:

- Use an ABCDE assessment
- Aim for SpO_2 of 94–98% and normal $PaCO_2$
- Maintain SBP and mean > 10th percentile
- Avoid/manage hypothermia
- Glucose control
- Treat precipitating cause

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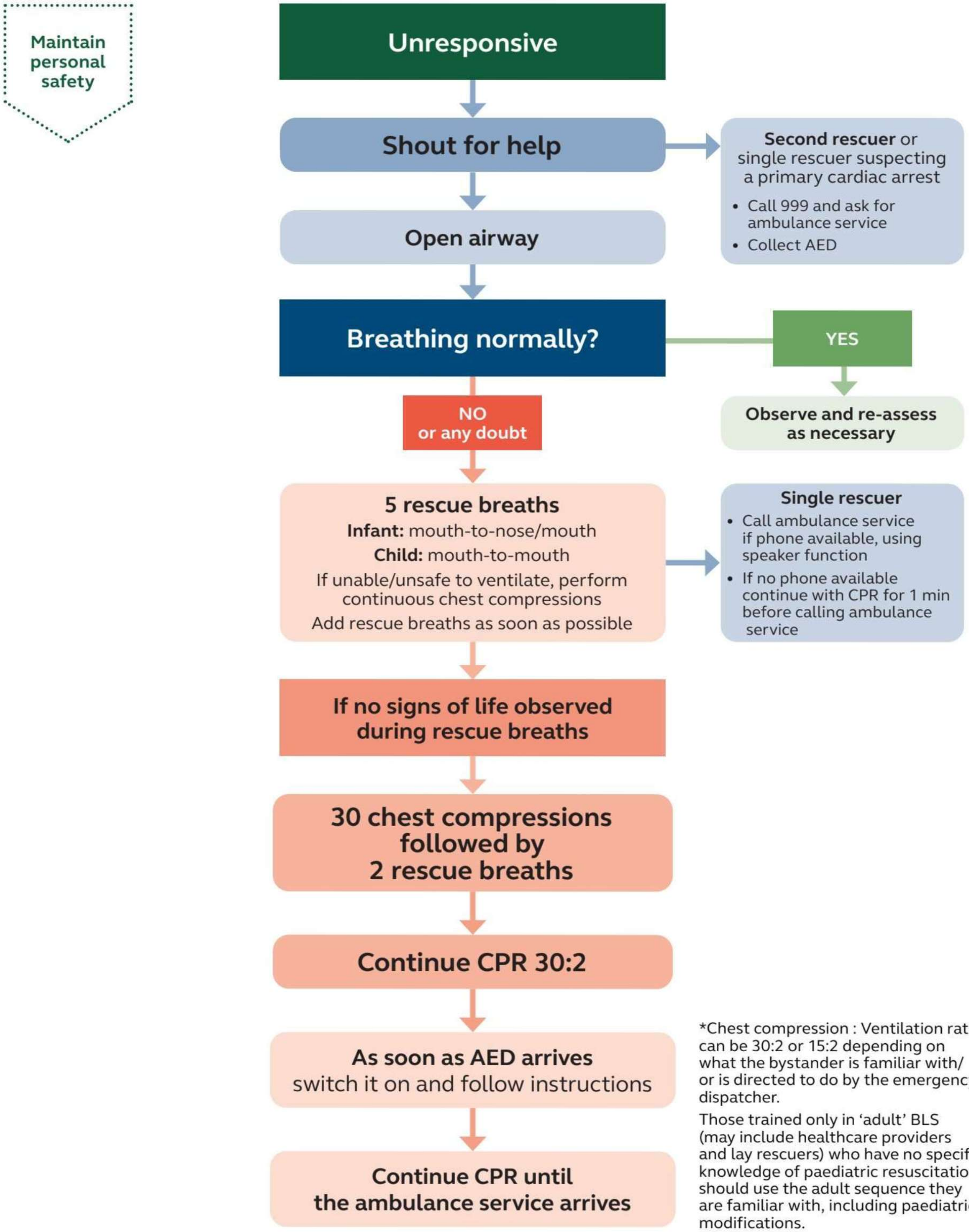
Paediatric out-of-hospital basic life support



Maintain personal safety

Unresponsive

Shout for help

Second rescuer or single rescuer suspecting a primary cardiac arrest

- Call 999 and ask for ambulance service
- Collect AED

Open airway

Breathing normally?

YES

Observe and re-assess as necessary

NO or any doubt

5 rescue breaths

Infant: mouth-to-nose/mouth

Child: mouth-to-mouth

If unable/unsafe to ventilate, perform continuous chest compressions

Add rescue breaths as soon as possible

Single rescuer

- Call ambulance service if phone available, using speaker function
- If no phone available continue with CPR for 1 min before calling ambulance service

If no signs of life observed during rescue breaths

30 chest compressions followed by 2 rescue breaths

Continue CPR 30:2

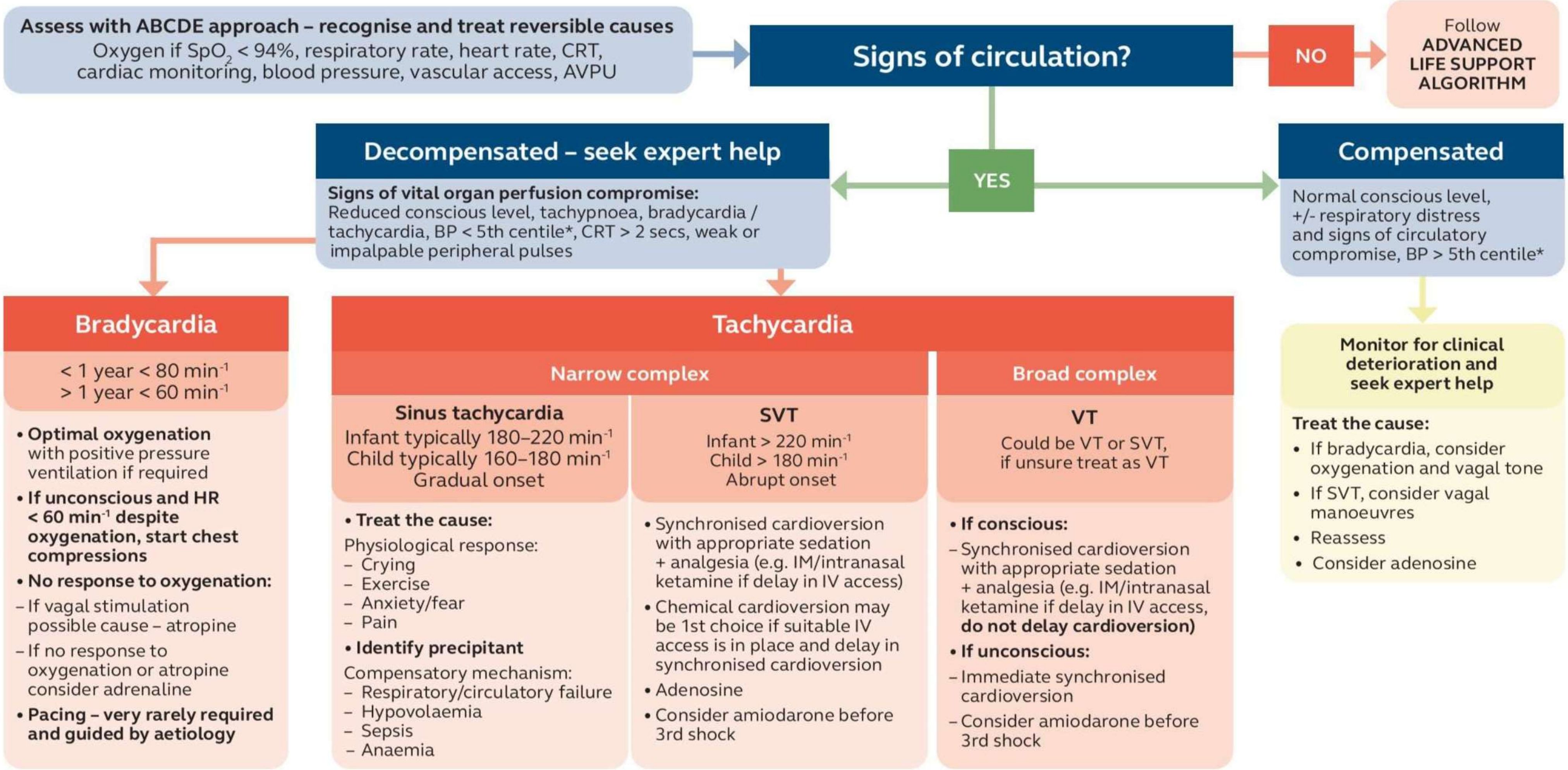
As soon as AED arrives switch it on and follow instructions

Continue CPR until the ambulance service arrives

*Chest compression : Ventilation ratio can be 30:2 or 15:2 depending on what the bystander is familiar with/ or is directed to do by the emergency dispatcher.

Those trained only in 'adult' BLS (may include healthcare providers and lay rescuers) who have no specific knowledge of paediatric resuscitation, should use the adult sequence they are familiar with, including paediatric modifications.

Paediatric cardiac arrhythmias



Assess with ABCDE approach – recognise and treat reversible causes
Oxygen if $SpO_2 < 94\%$, respiratory rate, heart rate, CRT, cardiac monitoring, blood pressure, vascular access, AVPU

Signs of circulation?

NO → Follow **ADVANCED LIFE SUPPORT ALGORITHM**

YES

Decompensated – seek expert help

Signs of vital organ perfusion compromise:
Reduced conscious level, tachypnoea, bradycardia / tachycardia, BP < 5th centile*, CRT > 2 secs, weak or impalpable peripheral pulses

Compensated

Normal conscious level, +/- respiratory distress and signs of circulatory compromise, BP > 5th centile*

Monitor for clinical deterioration and seek expert help

Treat the cause:

- If bradycardia, consider oxygenation and vagal tone
- If SVT, consider vagal manoeuvres
- Reassess
- Consider adenosine

Bradycardia

< 1 year < 80 min^{-1}
> 1 year < 60 min^{-1}

- **Optimal oxygenation** with positive pressure ventilation if required
- **If unconscious and HR < 60 min^{-1} despite oxygenation, start chest compressions**
- **No response to oxygenation:**
  - If vagal stimulation possible cause – atropine
  - If no response to oxygenation or atropine consider adrenaline
- **Pacing – very rarely required and guided by aetiology**

Tachycardia

Narrow complex

Sinus tachycardia
Infant typically 180–220 min^{-1}
Child typically 160–180 min^{-1}
Gradual onset

- **Treat the cause:**
  Physiological response:
  - Crying
  - Exercise
  - Anxiety/fear
  - Pain
- **Identify precipitant**
  Compensatory mechanism:
  - Respiratory/circulatory failure
  - Hypovolaemia
  - Sepsis
  - Anaemia

SVT
Infant > 220 min^{-1}
Child > 180 min^{-1}
Abrupt onset

- Synchronised cardioversion with appropriate sedation + analgesia (e.g. IM/intranasal ketamine if delay in IV access)
- Chemical cardioversion may be 1st choice if suitable IV access is in place and delay in synchronised cardioversion
- Adenosine
- Consider amiodarone before 3rd shock

Broad complex

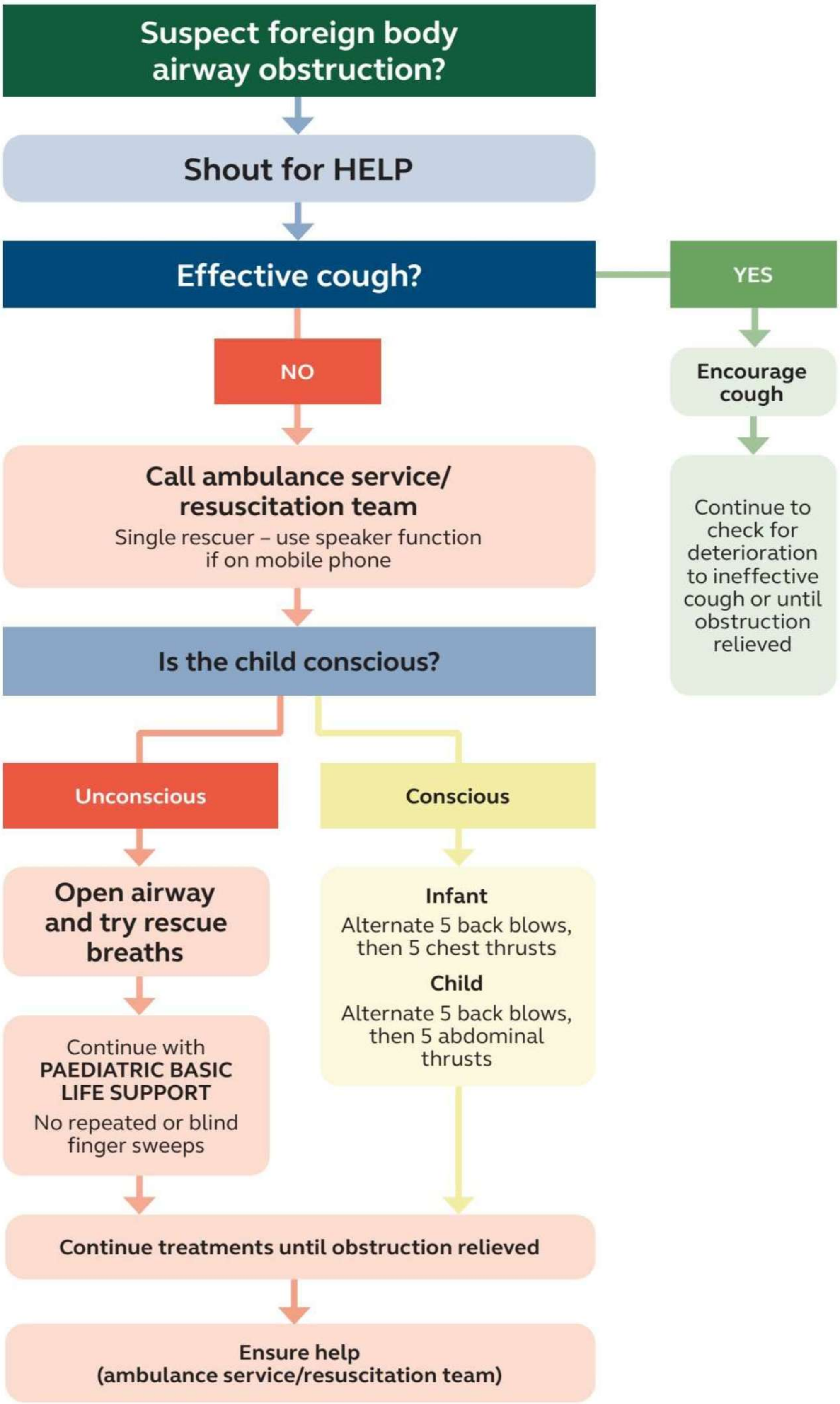
VT
Could be VT or SVT, if unsure treat as VT

- **If conscious:**
  - Synchronised cardioversion with appropriate sedation + analgesia (e.g. IM/intranasal ketamine if delay in IV access, **do not delay cardioversion)**
- **If unconscious:**
  - Immediate synchronised cardioversion
  - Consider amiodarone before 3rd shock

Drug	Atropine	Adrenaline	Adenosine	Amiodarone	Synchronised cardioversion	Magnesium
Treatment	**Up to 11 years:** 20 mcg kg^{-1} (max. 0.5 mg) **12–17 years:** 300–600 mcg, larger doses may be used in emergency	**For bradycardia:** 1–2 mcg kg^{-1} or continuous infusion	**Infants > 1 month & children up to 17 years**: 0.1–0.2 mg kg^{-1} (100-200 mcg kg^{-1}) **If the SVT persists:** give a 0.3 mg kg^{-1} (300 mcg kg^{-1}) (max. 12–18 mg) after at least 1 min.	5 mg kg^{-1} – by SLOW IV infusion (> 20 min) before 3rd cardioversion in discussion with paediatric cardiologist/expert	With appropriate sedation + analgesia (e.g. IM/intranasal Ketamine if delay in IV access + airway management) – IV access attempts must not delay cardioversion **1st shock:** 1 J kg^{-1} **Subsequent shocks:** doubling the energy with each subsequent attempt up to a max of 4 J kg^{-1}	25–50 mg kg^{-1} (max. 2 g) to be given over 10–15 min, may be repeated once if necessary, in Torsades de pointes VT

Age	*Systolic BP 5th centile mmHg
1 month	50
1 year	70
5 years	75
10 years	80

Paediatric choking



Suspect foreign body airway obstruction?

Shout for HELP

Effective cough?

YES

Encourage cough

Continue to check for deterioration to ineffective cough or until obstruction relieved

NO

Call ambulance service/ resuscitation team

Single rescuer – use speaker function if on mobile phone

Is the child conscious?

Unconscious

Open airway and try rescue breaths

Continue with **PAEDIATRIC BASIC LIFE SUPPORT**

No repeated or blind finger sweeps

Conscious

Infant

Alternate 5 back blows, then 5 chest thrusts

Child

Alternate 5 back blows, then 5 abdominal thrusts

Continue treatments until obstruction relieved

Ensure help
(ambulance service/resuscitation team)

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Newborn life support

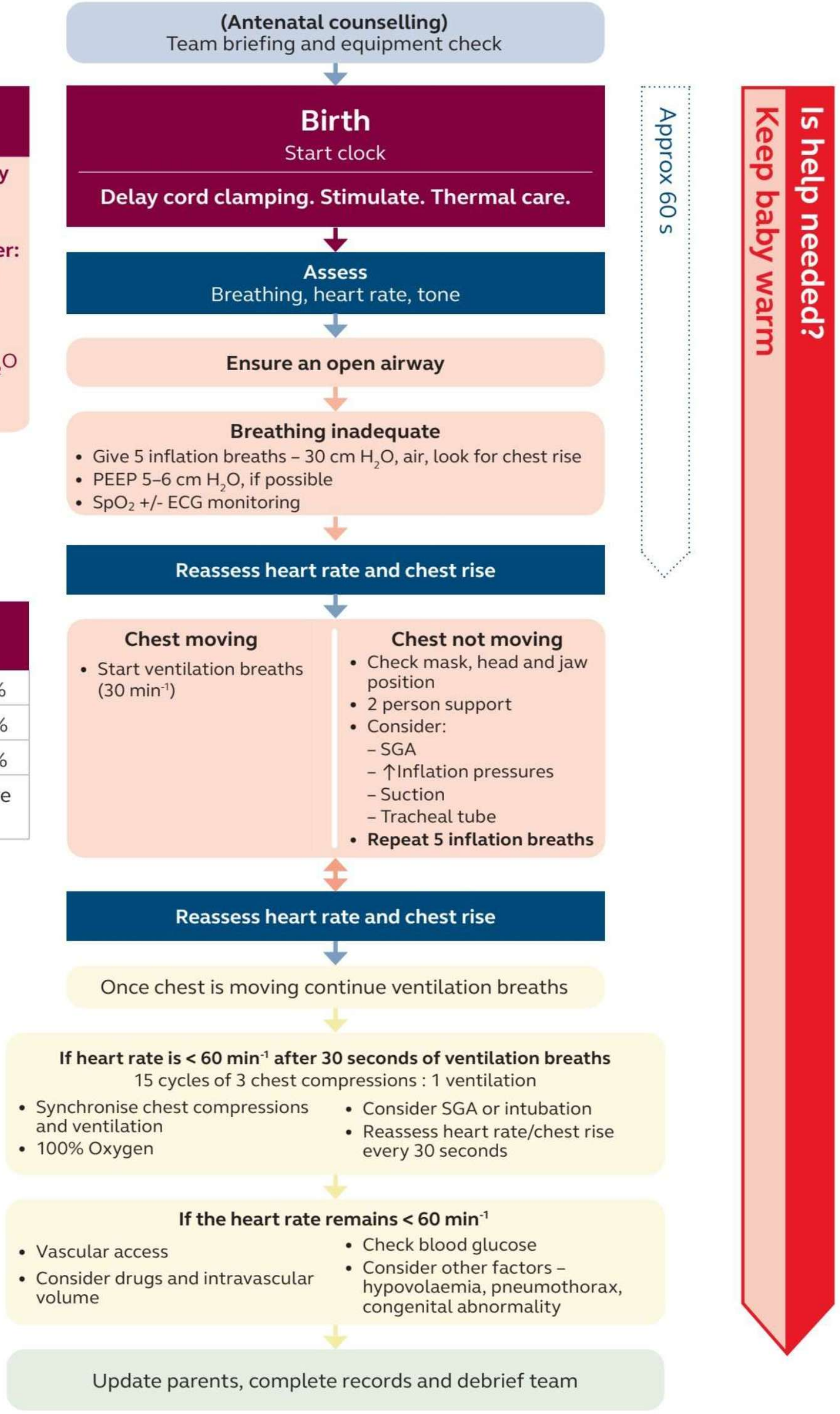
Preterm < 32 weeks

Place undried body in a plastic bag + radiant heat

If breathing consider:
- CPAP 5–8 cm H_2O
- 30% FiO_2

If not breathing:
- Initial PIP 25 cm H_2O
- Peep 5–6 cm H_2O
- 30% FiO_2

Acceptable pre-ductal SpO_2	
3 min	70–75%
5 min	80–85%
10 min	90–95%
Titrate O_2 to achieve target SpO_2	



(Antenatal counselling)
Team briefing and equipment check

Birth
Start clock

Delay cord clamping. Stimulate. Thermal care.

Assess
Breathing, heart rate, tone

Ensure an open airway

Breathing inadequate
- Give 5 inflation breaths – 30 cm H_2O, air, look for chest rise
- PEEP 5–6 cm H_2O, if possible
- SpO_2 +/- ECG monitoring

Reassess heart rate and chest rise

Chest moving
- Start ventilation breaths (30 min^{-1})

Chest not moving
- Check mask, head and jaw position
- 2 person support
- Consider:
  - – SGA
  - – ↑Inflation pressures
  - – Suction
  - – Tracheal tube
- **Repeat 5 inflation breaths**

Reassess heart rate and chest rise

Once chest is moving continue ventilation breaths

If heart rate is < 60 min^{-1} after 30 seconds of ventilation breaths
15 cycles of 3 chest compressions : 1 ventilation
- Synchronise chest compressions and ventilation
- 100% Oxygen
- Consider SGA or intubation
- Reassess heart rate/chest rise every 30 seconds

If the heart rate remains < 60 min^{-1}
- Vascular access
- Consider drugs and intravascular volume
- Check blood glucose
- Consider other factors – hypovolaemia, pneumothorax, congenital abnormality

Update parents, complete records and debrief team

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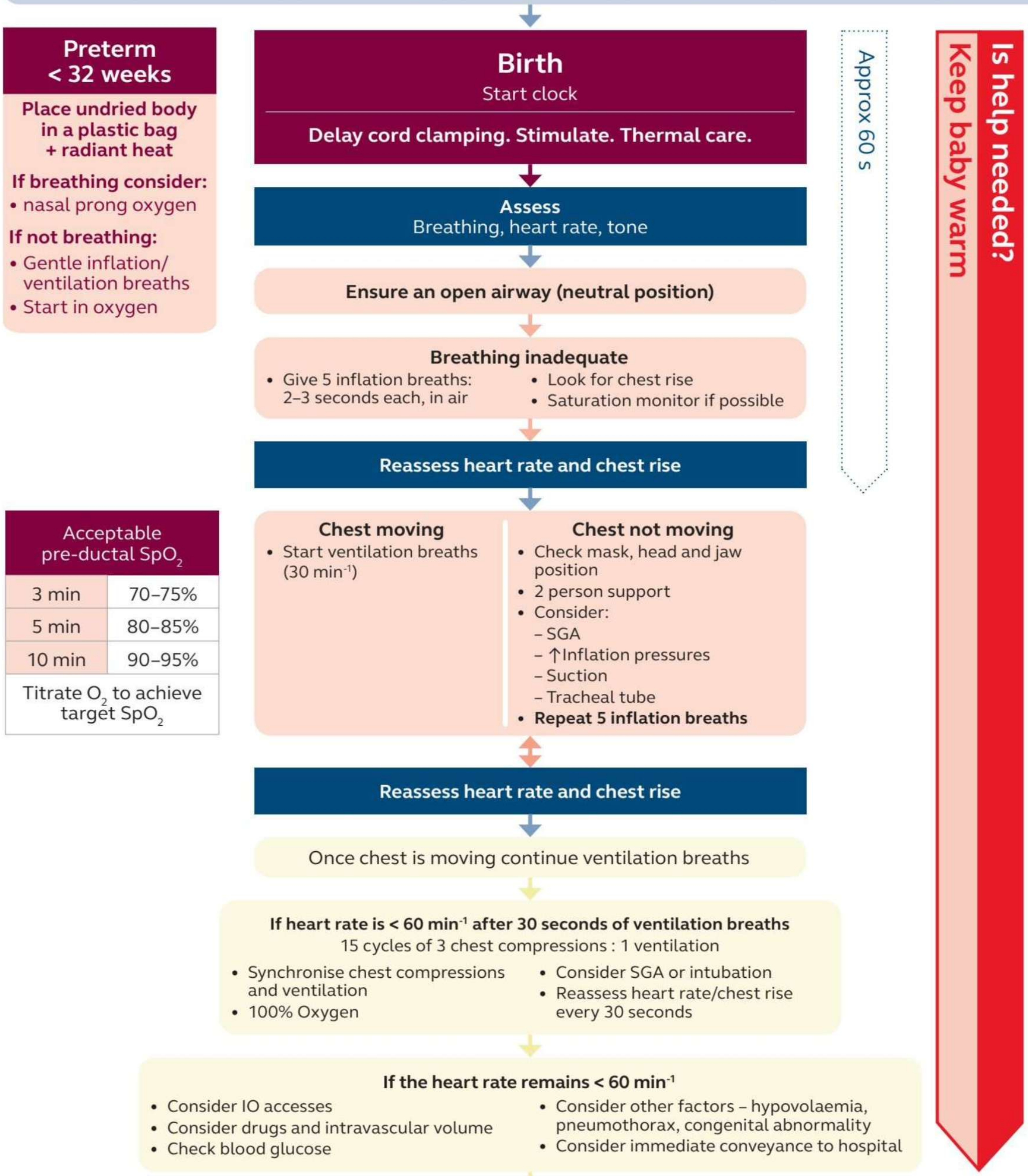
Out-of-hospital newborn life support

Information gathering, team briefing, equipment check, thermal adjuncts

Prioritise thermal care, avoid hypoxia, safe and timely conveyance to hospital



Preterm < 32 weeks

Place undried body in a plastic bag + radiant heat

If breathing consider:

- nasal prong oxygen

If not breathing:

- Gentle inflation/ ventilation breaths
- Start in oxygen

Birth

Start clock

Delay cord clamping. Stimulate. Thermal care.

Assess

Breathing, heart rate, tone

Ensure an open airway (neutral position)

Breathing inadequate

- Give 5 inflation breaths: 2–3 seconds each, in air
- Look for chest rise
- Saturation monitor if possible

Reassess heart rate and chest rise

Chest moving

- Start ventilation breaths (30 min^{-1})

Chest not moving

- Check mask, head and jaw position
- 2 person support
- Consider:
  - – SGA
  - – ↑Inflation pressures
  - – Suction
  - – Tracheal tube
- **Repeat 5 inflation breaths**

Reassess heart rate and chest rise

Once chest is moving continue ventilation breaths

If heart rate is < 60 min^{-1} after 30 seconds of ventilation breaths

15 cycles of 3 chest compressions : 1 ventilation

- Synchronise chest compressions and ventilation
- 100% Oxygen
- Consider SGA or intubation
- Reassess heart rate/chest rise every 30 seconds

If the heart rate remains < 60 min^{-1}

- Consider IO accesses
- Consider drugs and intravascular volume
- Check blood glucose
- Consider other factors – hypovolaemia, pneumothorax, congenital abnormality
- Consider immediate conveyance to hospital

Acceptable pre-ductal SpO_2	
3 min	70–75%
5 min	80–85%
10 min	90–95%
Titrate O_2 to achieve target SpO_2	

Approx 60 s

Keep baby warm

Is help needed?

Update parents, complete records, debrief team, complete TABCDEF and pre-alert to hospital

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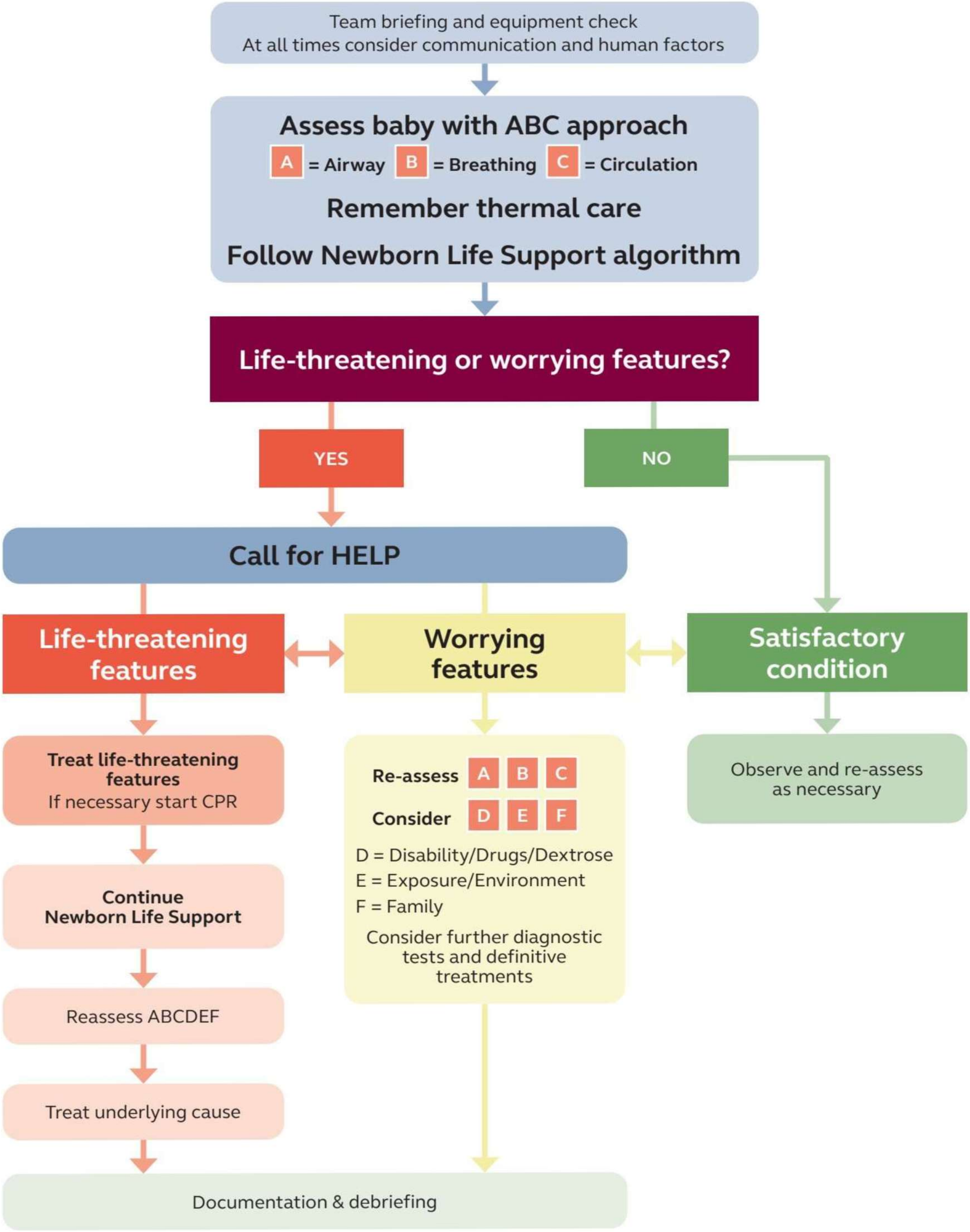
Advanced resuscitation of the newborn infant



Team briefing and equipment check
At all times consider communication and human factors

Assess baby with ABC approach

A = Airway B = Breathing C = Circulation

Remember thermal care

Follow Newborn Life Support algorithm

Life-threatening or worrying features?

YES → **Call for HELP**

NO → **Satisfactory condition**

Life-threatening features

Treat life-threatening features
If necessary start CPR

Continue Newborn Life Support

Reassess ABCDEF

Treat underlying cause

Worrying features

Re-assess A B C

Consider D E F

D = Disability/Drugs/Dextrose
E = Exposure/Environment
F = Family

Consider further diagnostic tests and definitive treatments

Satisfactory condition

Observe and re-assess as necessary

Documentation & debriefing

Resuscitation Council UK

GUIDELINES 2025

Paediatric emergency drug chart

		Adrenaline	Fluid bolus	Glucose	Tracheal tube		Defibrillation*
					Uncuffed	Cuffed	
Strength		**1:10,000 (1 mg in 10 mL (100 mcg mL^{-1}))**	**Balanced isotonic crystalloid OR, 0.9% saline**	**10%**			
Dose		**10 mcg kg^{-1}**	**10 mL kg^{-1}**	**2 mL kg^{-1}**			**4 joules kg^{-1}**
Route		**IV, IO**	**IV, IO**	**IV, IO**			**Transthoracic**
Notes			**Consider warmed fluids**	**For known hypoglycaemia** Recheck glucose 5–10 min after dose and repeat as required		**Monitor cuff pressure**	**Monophasic or biphasic**
Age	**Weight kg**	**mL**	**mL**	**mL**	**ID mm**	**ID mm**	**Manual**
< 1 month	3.5	0.35	35	7	3.0	N/A	20
1 month	4	0.4	40	8	3.0–3.5	3.0	20
3 months	5	0.5	50	10	3.5	3.0	20
6 months	7	0.7	70	14	3.5	3.0	30
1 year	10	1.0	100	20	4.0	3.5	40
2 years	12	1.2	120	24	4.5	4.0	50
3 years	14	1.4	140	28	4.5–5.0	4.0–4.5	60
4 years	16	1.6	160	32	5.0	4.5	60
5 years	18	1.8	180	36	5.0–5.5	4.5–5.0	70
6 years	20	2.0	200	40	5.5	5.0	80
7 years	23	2.3	230	46	5.5–6.0	5.0–5.5	100
8 years	26	2.6	260	**50**	–	6.0–6.5	100
10 years	30	3.0	300	**50**	–	7.0	120
12 years	38	3.8	380	**50**	–	7–7.5	120
14 years	**50**	**5.0**	**500**	**50**	**–**	**7–8**	**150**
Adolescent	**50**	**5.0**	**500**	**50**	**–**	**7–8**	**150**
Adult	**70**	**10.0**	**500**	**50**	**–**	**7–8**	**150**

Cardioversion	Synchronised shock, 1.0 joules kg^{-1}, doubling the energy with each subsequent attempt up to a maximum of 4 J kg^{-1} if unsuccessful.			
Amiodarone	5 mg kg^{-1} IV/IO bolus (max 300 mg) in cardiac arrest after 3rd and 5th shocks. Flush with 0.9% saline or 5% glucose (over 60 min if child is NOT in cardiac arrest).			
Atropine	20 mcg kg^{-1} IV (max 600 mcg).			
Calcium gluconate 10%	Unstable arrhythmia due to hyperkalaemia 0.5 mL kg^{-1} IV over 5–10 min (max 30 mL), repeat after 5–10 min if ECG changes persist.			
Lorazepam	100 mcg kg^{-1} IV/IO (max 4 mg) for treatment of seizures. Can be repeated after 10 min.			
Adenosine	IV/IO for treatment of SVT. Requires a large saline flush and ECG monitoring.	**Neonate:** 150 mcg kg^{-1}, increase dose in steps of 50–100 mcg kg^{-1} every 1–2 min for repeat doses (max 300 mcg kg^{-1}).		**Infants > 1 month & children up to 17 years:** 0.1–0.2 mg kg^{-1} (100-200 mcg kg^{-1}). If SVT persists, give a 0.3 mg kg^{-1} (300 mcg kg^{-1}) (max. 12–18 mg) after at least 1 min.
Anaphylaxis	Adrenaline 1:1000 IM. Can be repeated after 5 min. After 2 IM injections, treat as refractory anaphylaxis and start low-dose adrenaline infusion IV.	**< 6 months:** 100–150 mcg (0.1–0.15 mL)	**> 6 months–6 years:** 150 mcg (0.15 mL)	**> 6–12 years:** 300 mcg (0.3 mL)

Anaphylaxis (continued)	**> 12 years:** 500 mcg (0.5 mL)

Weights averaged on lean body mass from 50th centile weights for males and females.

Drug doses based on Resuscitation Council UK Guidelines 2025 recommendations.

Recommendations for tracheal tubes are based on full-term neonates.

For newborns, glucose at 2.5 mL kg^{-1} is recommended.

*Defibrillation: Refractory VF/pVT post 5th shock Infant/child: Increase energy stepwise, up to a maximum of 8 J kg^{-1} (max 360 J). Adolescents: Increase energy to 360 J.

Obstetric Cardiac Arrest

Resuscitation Council UK
MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

Alterations in maternal physiology and exacerbations of pregnancy related pathologies must be considered. Priorities include calling the appropriate team members, relieving aortocaval compression, effective cardiopulmonary resuscitation (CPR), consideration of causes and performing a timely emergency hysterotomy (perimortem caesarean section) when ≥ 20 weeks.

START

❶ **Confirm cardiac arrest** and **call for help. Declare 'Obstetric cardiac arrest'**
- Team for mother and team for neonate if > 20 weeks

❷ **Lie flat, apply manual uterine displacement to the left**
- Or left lateral tilt (from head to toe at an angle of 15–30° on a firm surface)

❸ **Commence CPR** and request **cardiac arrest trolley**
- Standard CPR ratios and hand position apply
- **Evaluate potential causes (Box A)**

❹ **Identify team leader, allocate roles including scribe**
- Note time

❺ **Apply defibrillation pads and check cardiac rhythm** (defibrillation is safe in pregnancy and no changes to standard shock energies are required))
- if VF / pulseless VT ➔ defibrillation and first adrenaline and amiodarone after 3rd shock
- If PEA / asystole ➔ resume CPR and give first adrenaline immediately
- Check rhythm and pulse every 2 minutes
- Repeat adrenaline every 3-5 minutes

❻ **Maintain airway and ventilation**
- Give 100% oxygen using bag-valve-mask device
- Insert supraglottic airway with drain port –*or*– tracheal tube if trained to do so (intubation may be difficult, and airway pressures may be higher)
- Apply waveform capnography monitoring to airway
- If expired CO_2 is absent, presume oesophageal intubation until absolutely excluded

❼ **Circulation**
- I.V. access above the diaphragm, if fails or impossible use upper limb intraosseous (IO)
- See **Box B** for reminders about drugs
- Consider extracorporeal CPR (ECPR) if available

❽ **Emergency hysterotomy (perimortem caesarean section)**
- Perform if ≥ 20 weeks gestation, to improve maternal outcome
- Perform immediately if maternal fatal injuries or prolonged pre-hospital arrest
- Perform by 5 minutes if no return of spontaneous circulation

❾ **Post resuscitation from haemorrhage - activate Massive Haemorrhage Protocol**
Consider uterotonic drugs, fibrinogen and tranexamic acid
Uterine tamponage / sutures, aortic compression, hysterectomy

Version 1.1

Box A: POTENTIAL CAUSES *4H's and 4T's* (specific to obstetrics)

Hypoxia	Respiratory – Pulmonary embolus (PE), Failed intubation, aspiration Heart failure Anaphylaxis Eclampsia / PET – pulmonary oedema, seizure
Hypovolaemia	Haemorrhage – obstetric (remember concealed), abnormal placentation, uterine rupture, atony, splenic artery/hepatic rupture, aneurysm rupture Cardiac – arrhythmia, myocardial infarction (MI) Distributive – sepsis, high regional block, anaphylaxis
Hypo/hyperkalaemia	Also consider blood sugar, sodium, calcium and magnesium levels
Hypothermia	
Tamponade	Aortic dissection, peripartum cardiomyopathy, trauma
Thrombosis	Amniotic fluid embolus, PE, MI, air embolism
Toxins	Local anaesthetic, magnesium, illicit drugs
Tension pneumothorax	Entonox in pre-existing pneumothorax, trauma

Box B: IV DRUGS FOR USE DURING CARDIAC ARREST

Fluids	**500 mL IV** crystalloid bolus
Adrenaline	**1 mg IV** every 3-5 minutes in non-shockable or after 3rd shock
Amiodarone	**300 mg IV** after 3rd shock
Atropine	**0.5-1 mg IV** up to 3 mg if vagal tone likely cause
Calcium chloride	**10% 10 mL** IV for Mg overdose, low calcium or hyperkalaemia
Magnesium	**2 g IV** for polymorphic VT / hypomagnesaemia, **4 g IV** for eclampsia
Thrombolysis/PCI	For suspected massive pulmonary embolus / MI
Tranexamic acid	**1 g** if haemorrhage
Intralipid	**1.5 mL kg^{-1} IV** bolus and **15 mL kg^{-1} hr^{-1} IV** infusion

Obstetric Anaesthetists' Association
Promoting the highest standards of anaesthetic practice in the care of mother and baby
GUIDELINES 2021

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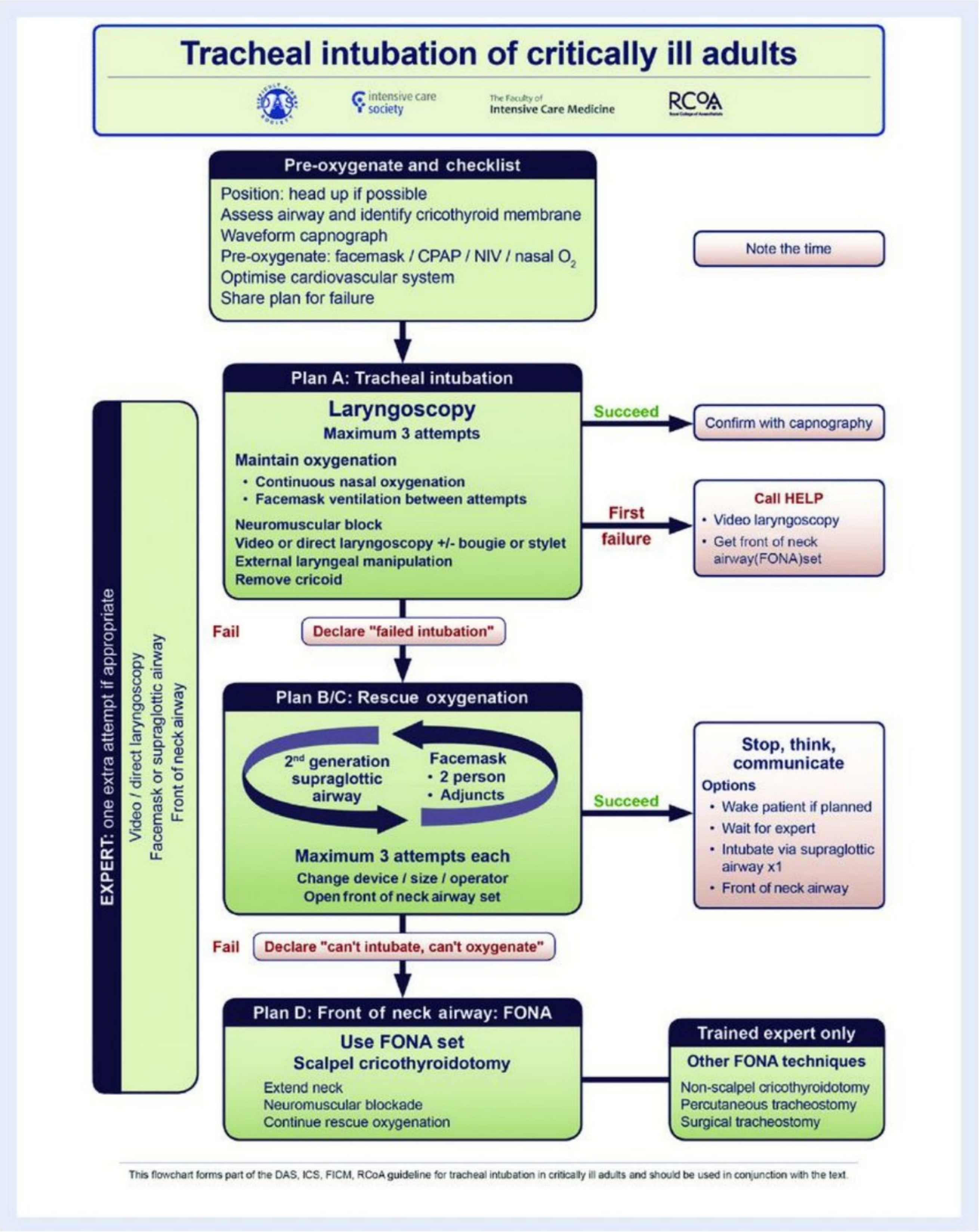


Tracheal intubation of critically ill adults

DAS · intensive care society · The Faculty of Intensive Care Medicine · RCoA

Pre-oxygenate and checklist

Position: head up if possible
Assess airway and identify cricothyroid membrane
Waveform capnograph
Pre-oxygenate: facemask / CPAP / NIV / nasal O_2
Optimise cardiovascular system
Share plan for failure

Note the time

Plan A: Tracheal intubation

Laryngoscopy
Maximum 3 attempts

Maintain oxygenation
- Continuous nasal oxygenation
- Facemask ventilation between attempts

Neuromuscular block
Video or direct laryngoscopy +/- bougie or stylet
External laryngeal manipulation
Remove cricoid

Succeed → Confirm with capnography

First failure → **Call HELP**
- Video laryngoscopy
- Get front of neck airway(FONA)set

Fail — **Declare "failed intubation"**

Plan B/C: Rescue oxygenation

2nd generation supraglottic airway

Facemask
- 2 person
- Adjuncts

Maximum 3 attempts each
Change device / size / operator
Open front of neck airway set

Succeed → **Stop, think, communicate**

Options
- Wake patient if planned
- Wait for expert
- Intubate via supraglottic airway x1
- Front of neck airway

Fail — **Declare "can't intubate, can't oxygenate"**

Plan D: Front of neck airway: FONA

Use FONA set
Scalpel cricothyroidotomy

Extend neck
Neuromuscular blockade
Continue rescue oxygenation

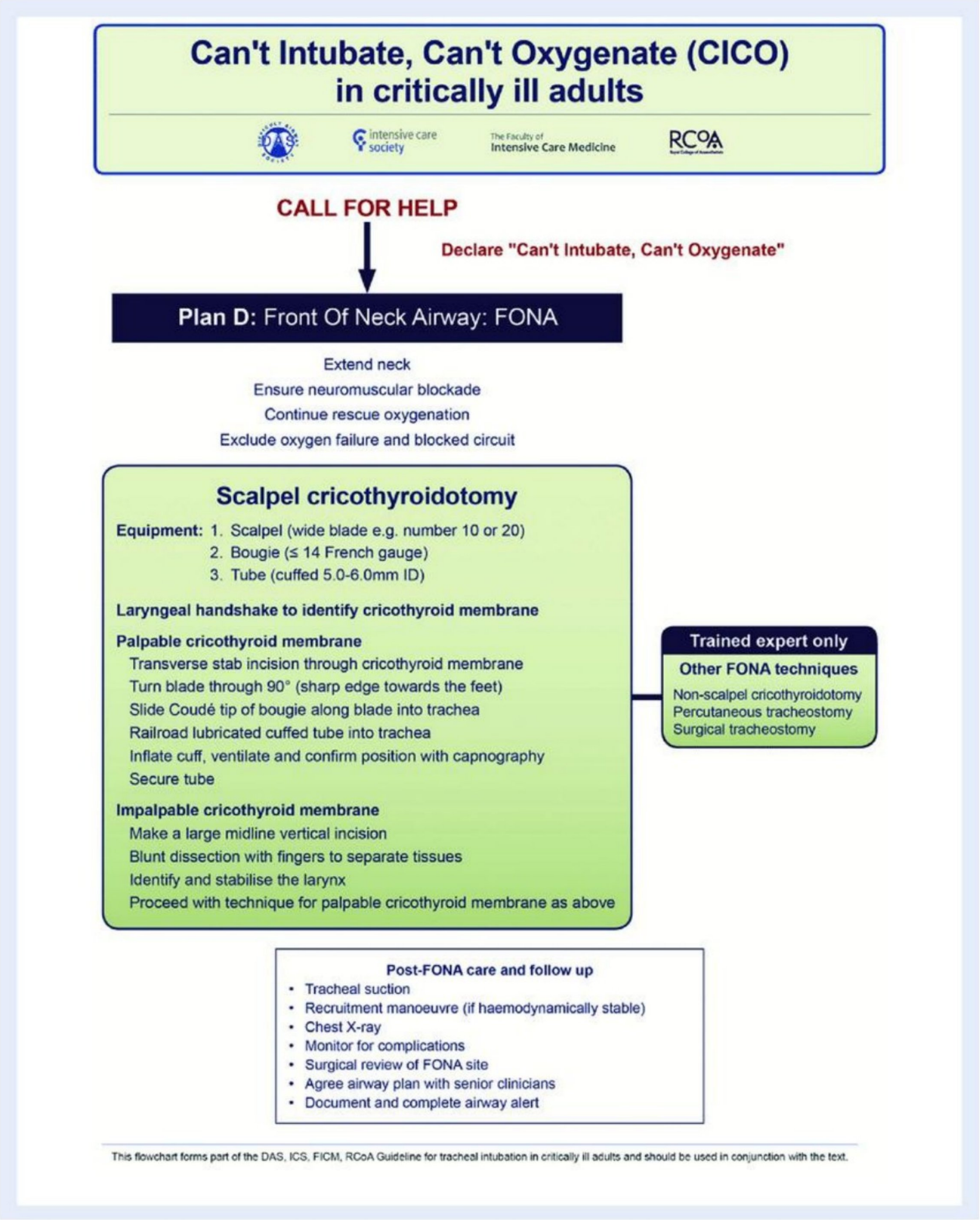
Trained expert only

Other FONA techniques

Non-scalpel cricothyroidotomy
Percutaneous tracheostomy
Surgical tracheostomy

EXPERT: one extra attempt if appropriate
Video / direct laryngoscopy
Facemask or supraglottic airway
Front of neck airway

This flowchart forms part of the DAS, ICS, FICM, RCoA guideline for tracheal intubation in critically ill adults and should be used in conjunction with the text.



Can't Intubate, Can't Oxygenate (CICO) in critically ill adults

DAS · intensive care society · The Faculty of Intensive Care Medicine · RCoA

CALL FOR HELP

Declare "Can't Intubate, Can't Oxygenate"

Plan D: Front Of Neck Airway: FONA

Extend neck
Ensure neuromuscular blockade
Continue rescue oxygenation
Exclude oxygen failure and blocked circuit

Scalpel cricothyroidotomy

Equipment:
1. Scalpel (wide blade e.g. number 10 or 20)
2. Bougie (≤ 14 French gauge)
3. Tube (cuffed 5.0-6.0mm ID)

Laryngeal handshake to identify cricothyroid membrane

Palpable cricothyroid membrane

Transverse stab incision through cricothyroid membrane
Turn blade through 90° (sharp edge towards the feet)
Slide Coudé tip of bougie along blade into trachea
Railroad lubricated cuffed tube into trachea
Inflate cuff, ventilate and confirm position with capnography
Secure tube

Impalpable cricothyroid membrane

Make a large midline vertical incision
Blunt dissection with fingers to separate tissues
Identify and stabilise the larynx
Proceed with technique for palpable cricothyroid membrane as above

Trained expert only

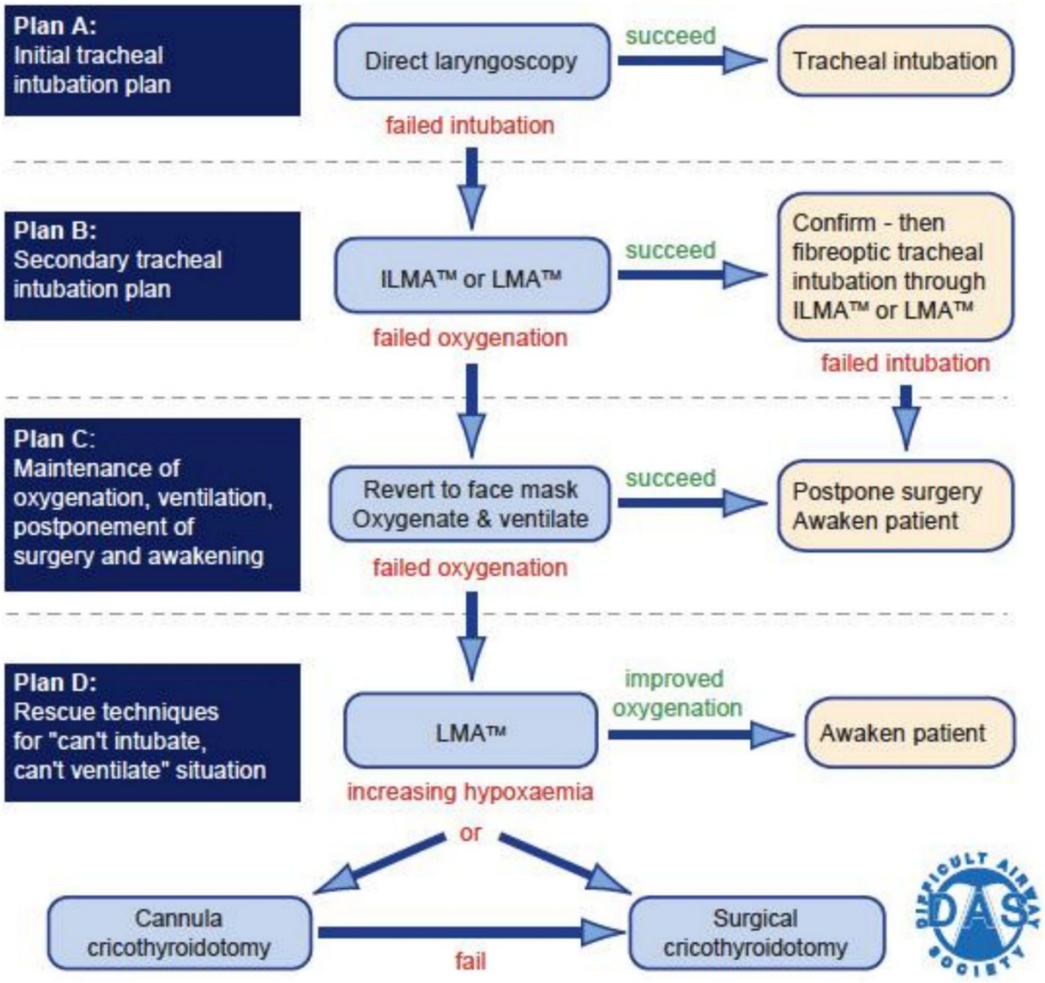
Other FONA techniques

Non-scalpel cricothyroidotomy
Percutaneous tracheostomy
Surgical tracheostomy

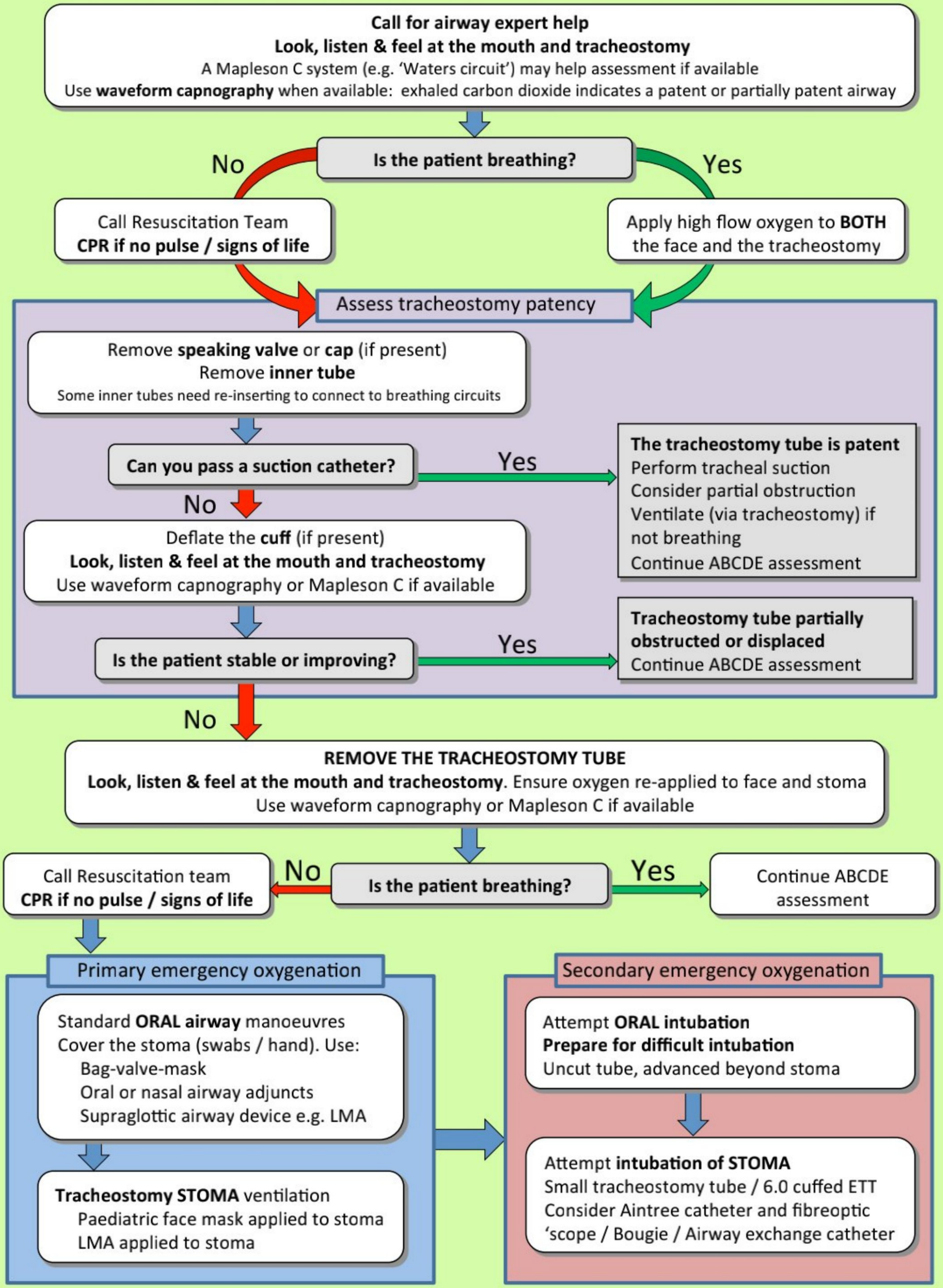
Post-FONA care and follow up

- Tracheal suction
- Recruitment manoeuvre (if haemodynamically stable)
- Chest X-ray
- Monitor for complications
- Surgical review of FONA site
- Agree airway plan with senior clinicians
- Document and complete airway alert

This flowchart forms part of the DAS, ICS, FICM, RCoA Guideline for tracheal intubation in critically ill adults and should be used in conjunction with the text.


Plan A:
Initial tracheal intubation plan
Direct laryngoscopy
succeed
Tracheal intubation
failed intubation
Plan B:
Secondary tracheal intubation plan
ILMA™ or LMA™
succeed
Confirm - then fibreoptic tracheal intubation through ILMA™ or LMA™
failed oxygenation
failed intubation
Plan C:
Maintenance of oxygenation, ventilation, postponement of surgery and awakening
Revert to face mask Oxygenate & ventilate
succeed
Postpone surgery Awaken patient
failed oxygenation
Plan D:
Rescue techniques for "can't intubate, can't ventilate" situation
LMA™
improved oxygenation
Awaken patient
increasing hypoxaemia
or
Cannula cricothyroidotomy
fail
Surgical cricothyroidotomy
DIFFICULT AIRWAY SOCIETY
DAS

Emergency tracheostomy management - Patent upper airway



Call for airway expert help
Look, listen & feel at the mouth and tracheostomy
A Mapleson C system (e.g. 'Waters circuit') may help assessment if available
Use **waveform capnography** when available: exhaled carbon dioxide indicates a patent or partially patent airway

Is the patient breathing?

No:
Call Resuscitation Team
CPR if no pulse / signs of life

Yes:
Apply high flow oxygen to **BOTH** the face and the tracheostomy

Assess tracheostomy patency

Remove **speaking valve** or **cap** (if present)
Remove **inner tube**
Some inner tubes need re-inserting to connect to breathing circuits

Can you pass a suction catheter?

Yes:
The tracheostomy tube is patent
Perform tracheal suction
Consider partial obstruction
Ventilate (via tracheostomy) if not breathing
Continue ABCDE assessment

No:
Deflate the **cuff** (if present)
Look, listen & feel at the mouth and tracheostomy
Use waveform capnography or Mapleson C if available

Is the patient stable or improving?

Yes:
Tracheostomy tube partially obstructed or displaced
Continue ABCDE assessment

No:
REMOVE THE TRACHEOSTOMY TUBE
Look, listen & feel at the mouth and tracheostomy. Ensure oxygen re-applied to face and stoma
Use waveform capnography or Mapleson C if available

Is the patient breathing?

Yes:
Continue ABCDE assessment

No:
Call Resuscitation team
CPR if no pulse / signs of life

Primary emergency oxygenation

Standard **ORAL airway** manoeuvres
Cover the stoma (swabs / hand). Use:
- Bag-valve-mask
- Oral or nasal airway adjuncts
- Supraglottic airway device e.g. LMA

Tracheostomy STOMA ventilation
- Paediatric face mask applied to stoma
- LMA applied to stoma

Secondary emergency oxygenation

Attempt **ORAL intubation**
Prepare for difficult intubation
Uncut tube, advanced beyond stoma

Attempt **intubation of STOMA**
Small tracheostomy tube / 6.0 cuffed ETT
Consider Aintree catheter and fibreoptic 'scope / Bougie / Airway exchange catheter

National Tracheostomy Safety Project. Review date 1/4/16. Feedback & resources at **www.tracheostomy.org.uk**

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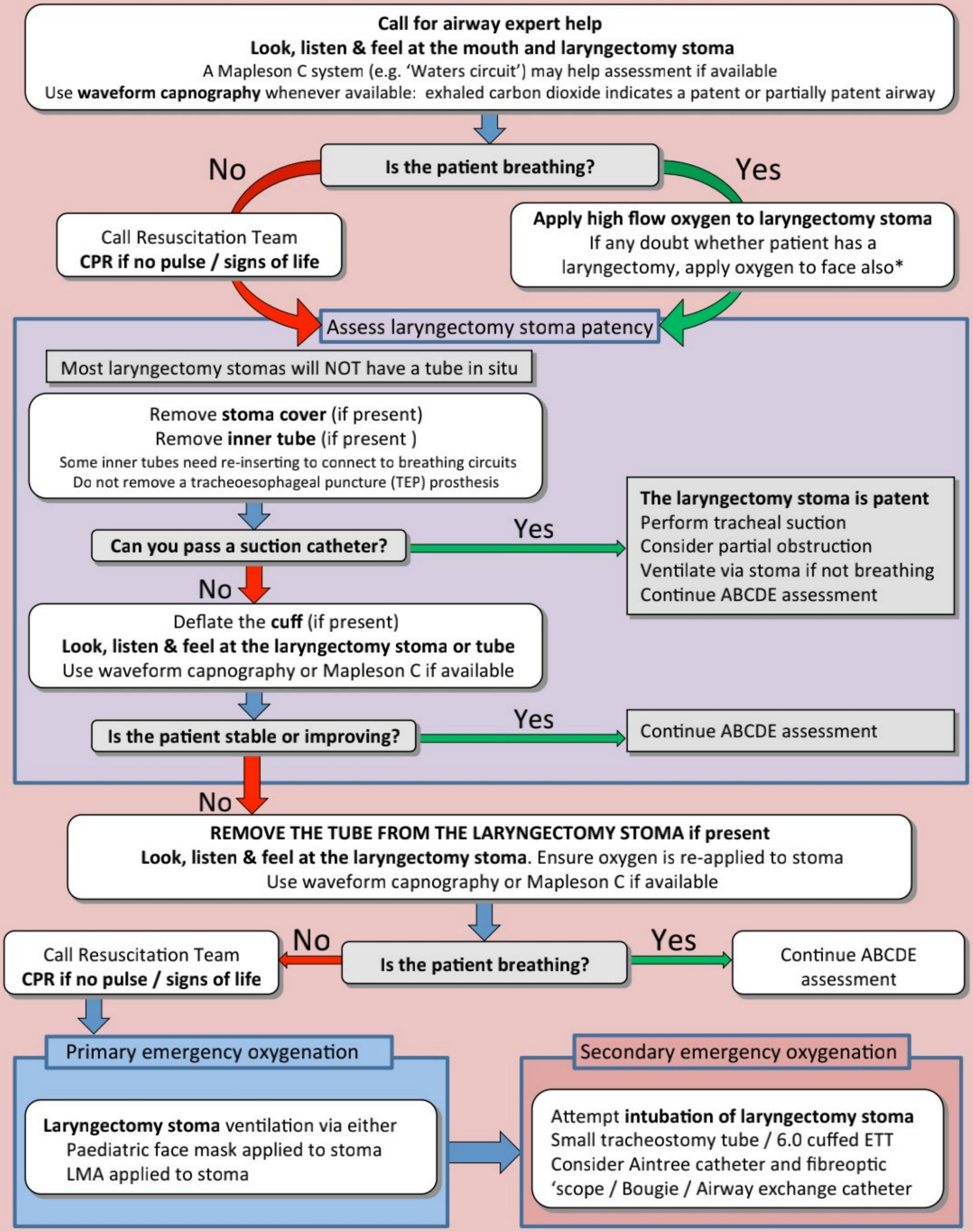
Emergency laryngectomy management



Call for airway expert help
Look, listen & feel at the mouth and laryngectomy stoma
A Mapleson C system (e.g. 'Waters circuit') may help assessment if available
Use **waveform capnography** whenever available: exhaled carbon dioxide indicates a patent or partially patent airway

Is the patient breathing?

No

Call Resuscitation Team
CPR if no pulse / signs of life

Yes

Apply high flow oxygen to laryngectomy stoma
If any doubt whether patient has a laryngectomy, apply oxygen to face also*

Assess laryngectomy stoma patency

Most laryngectomy stomas will NOT have a tube in situ

Remove **stoma cover** (if present)
Remove **inner tube** (if present)
Some inner tubes need re-inserting to connect to breathing circuits
Do not remove a tracheoesophageal puncture (TEP) prosthesis

Can you pass a suction catheter?

Yes

The laryngectomy stoma is patent
Perform tracheal suction
Consider partial obstruction
Ventilate via stoma if not breathing
Continue ABCDE assessment

No

Deflate the **cuff** (if present)
Look, listen & feel at the laryngectomy stoma or tube
Use waveform capnography or Mapleson C if available

Is the patient stable or improving?

Yes

Continue ABCDE assessment

No

REMOVE THE TUBE FROM THE LARYNGECTOMY STOMA if present
Look, listen & feel at the laryngectomy stoma. Ensure oxygen is re-applied to stoma
Use waveform capnography or Mapleson C if available

Is the patient breathing?

No

Call Resuscitation Team
CPR if no pulse / signs of life

Yes

Continue ABCDE assessment

Primary emergency oxygenation

Laryngectomy stoma ventilation via either
Paediatric face mask applied to stoma
LMA applied to stoma

Secondary emergency oxygenation

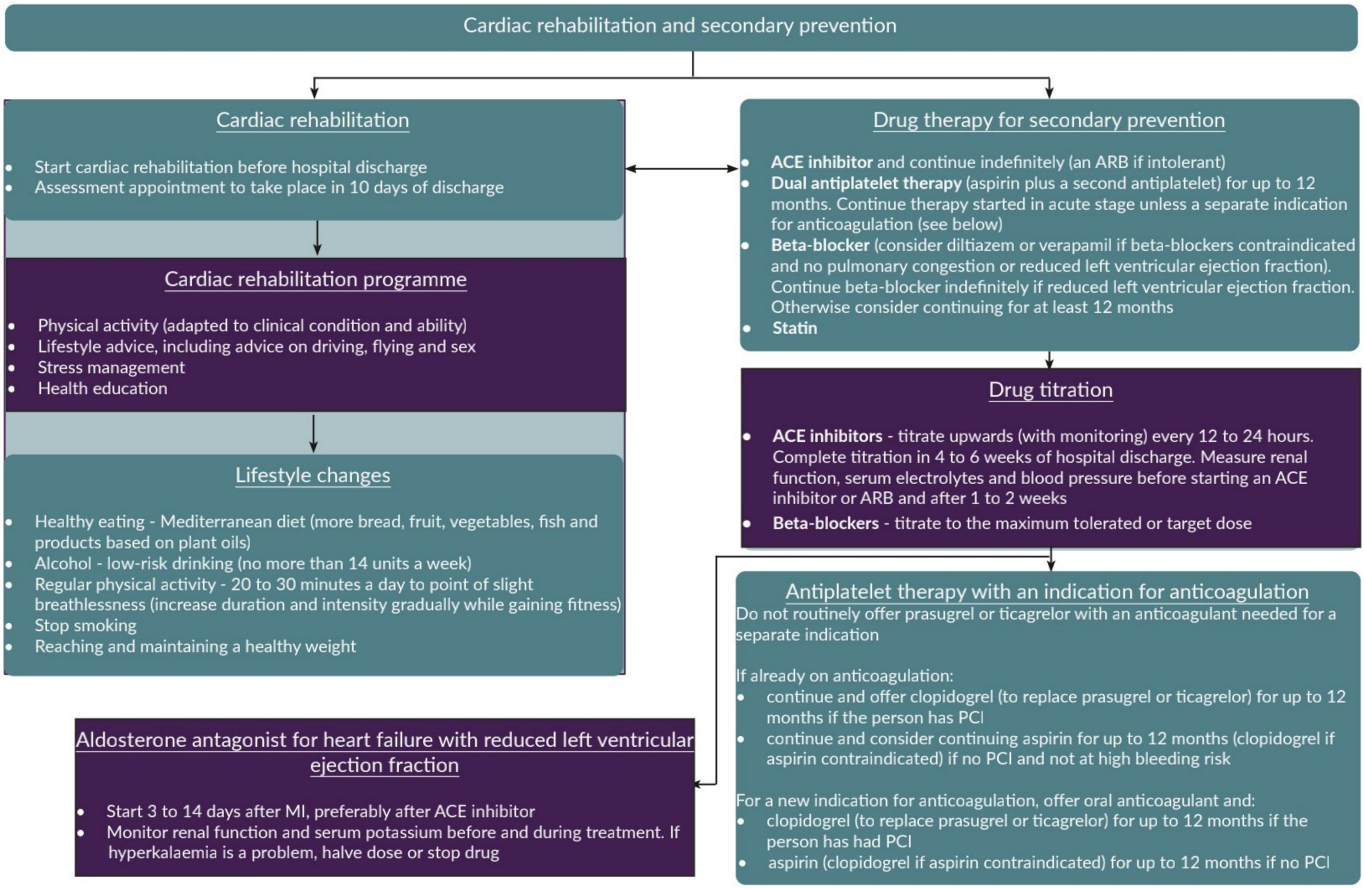
Attempt **intubation of laryngectomy stoma**
Small tracheostomy tube / 6.0 cuffed ETT
Consider Aintree catheter and fibreoptic 'scope / Bougie / Airway exchange catheter

* Laryngectomy patients have an end stoma and **cannot be oxygenated via the mouth or nose**
Applying oxygen to the face and stoma is the default emergency action for all patients with a tracheostomy

National Tracheostomy Safety Project. Review date 1/1/20 Feedback & resources at **www.tracheostomy.org.uk**

Cardiac rehabilitation and secondary prevention

NICE National Institute for Health and Care Excellence



Cardiac rehabilitation and secondary prevention

Cardiac rehabilitation

- Start cardiac rehabilitation before hospital discharge
- Assessment appointment to take place in 10 days of discharge

Cardiac rehabilitation programme

- Physical activity (adapted to clinical condition and ability)
- Lifestyle advice, including advice on driving, flying and sex
- Stress management
- Health education

Lifestyle changes

- Healthy eating - Mediterranean diet (more bread, fruit, vegetables, fish and products based on plant oils)
- Alcohol - low-risk drinking (no more than 14 units a week)
- Regular physical activity - 20 to 30 minutes a day to point of slight breathlessness (increase duration and intensity gradually while gaining fitness)
- Stop smoking
- Reaching and maintaining a healthy weight

Drug therapy for secondary prevention

- **ACE inhibitor** and continue indefinitely (an ARB if intolerant)
- **Dual antiplatelet therapy** (aspirin plus a second antiplatelet) for up to 12 months. Continue therapy started in acute stage unless a separate indication for anticoagulation (see below)
- **Beta-blocker** (consider diltiazem or verapamil if beta-blockers contraindicated and no pulmonary congestion or reduced left ventricular ejection fraction). Continue beta-blocker indefinitely if reduced left ventricular ejection fraction. Otherwise consider continuing for at least 12 months
- **Statin**

Drug titration

- **ACE inhibitors** - titrate upwards (with monitoring) every 12 to 24 hours. Complete titration in 4 to 6 weeks of hospital discharge. Measure renal function, serum electrolytes and blood pressure before starting an ACE inhibitor or ARB and after 1 to 2 weeks
- **Beta-blockers** - titrate to the maximum tolerated or target dose

Antiplatelet therapy with an indication for anticoagulation

Do not routinely offer prasugrel or ticagrelor with an anticoagulant needed for a separate indication

If already on anticoagulation:

- continue and offer clopidogrel (to replace prasugrel or ticagrelor) for up to 12 months if the person has PCI
- continue and consider continuing aspirin for up to 12 months (clopidogrel if aspirin contraindicated) if no PCI and not at high bleeding risk

For a new indication for anticoagulation, offer oral anticoagulant and:

- clopidogrel (to replace prasugrel or ticagrelor) for up to 12 months if the person has had PCI
- aspirin (clopidogrel if aspirin contraindicated) for up to 12 months if no PCI

Aldosterone antagonist for heart failure with reduced left ventricular ejection fraction

- Start 3 to 14 days after MI, preferably after ACE inhibitor
- Monitor renal function and serum potassium before and during treatment. If hyperkalaemia is a problem, halve dose or stop drug

This is a summary of the recommendations on cardiac rehabilitation and secondary prevention from NICE's guideline on acute coronary syndromes. See the guideline at www.nice.org.uk/guidance/NG185

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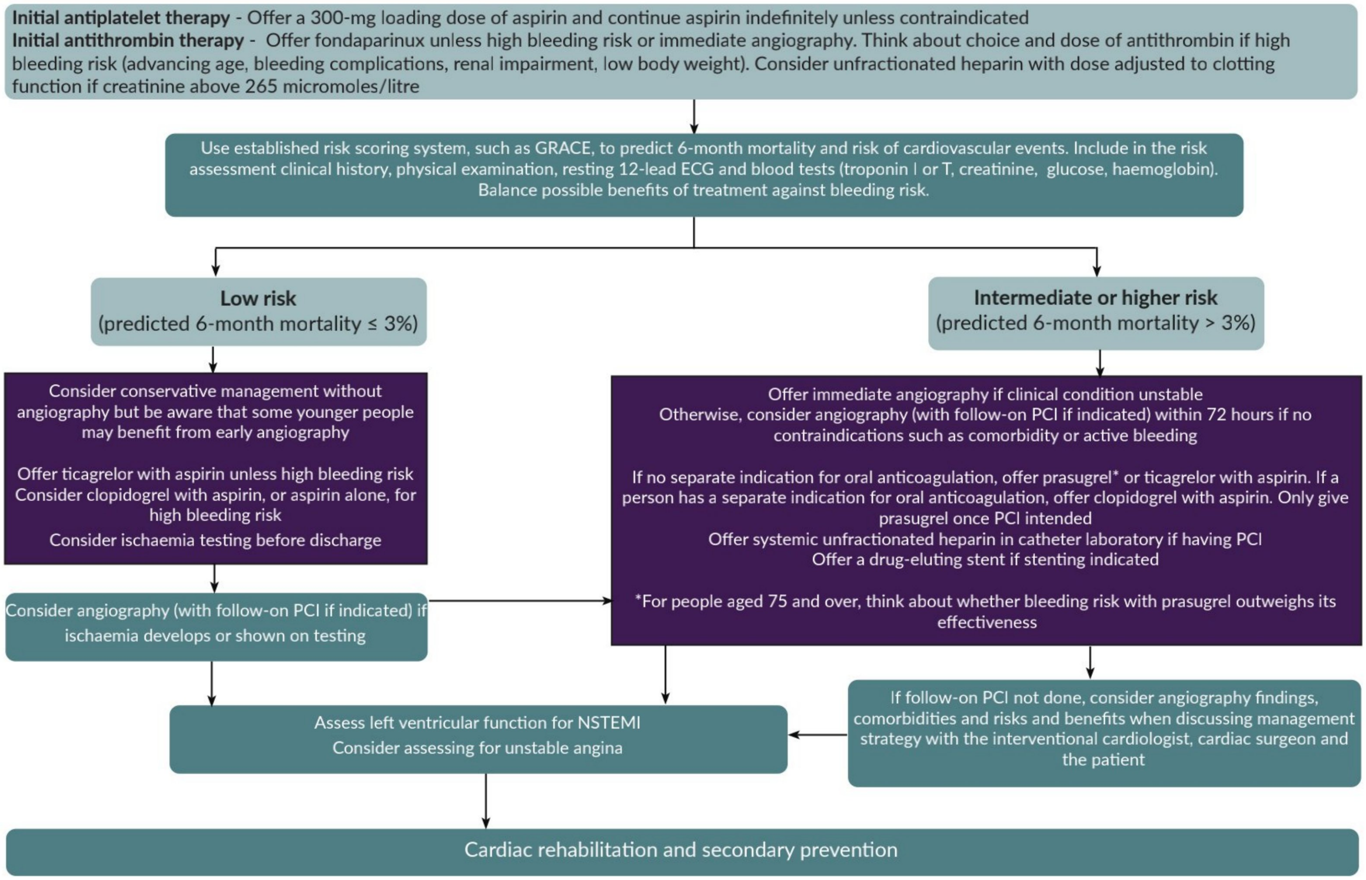
NSTEMI/unstable angina: early management

NICE National Institute for Health and Care Excellence



Initial antiplatelet therapy - Offer a 300-mg loading dose of aspirin and continue aspirin indefinitely unless contraindicated
Initial antithrombin therapy - Offer fondaparinux unless high bleeding risk or immediate angiography. Think about choice and dose of antithrombin if high bleeding risk (advancing age, bleeding complications, renal impairment, low body weight). Consider unfractionated heparin with dose adjusted to clotting function if creatinine above 265 micromoles/litre

Use established risk scoring system, such as GRACE, to predict 6-month mortality and risk of cardiovascular events. Include in the risk assessment clinical history, physical examination, resting 12-lead ECG and blood tests (troponin I or T, creatinine, glucose, haemoglobin). Balance possible benefits of treatment against bleeding risk.

Low risk
(predicted 6-month mortality ≤ 3%)

Consider conservative management without angiography but be aware that some younger people may benefit from early angiography

Offer ticagrelor with aspirin unless high bleeding risk
Consider clopidogrel with aspirin, or aspirin alone, for high bleeding risk
Consider ischaemia testing before discharge

Consider angiography (with follow-on PCI if indicated) if ischaemia develops or shown on testing

Intermediate or higher risk
(predicted 6-month mortality > 3%)

Offer immediate angiography if clinical condition unstable
Otherwise, consider angiography (with follow-on PCI if indicated) within 72 hours if no contraindications such as comorbidity or active bleeding

If no separate indication for oral anticoagulation, offer prasugrel* or ticagrelor with aspirin. If a person has a separate indication for oral anticoagulation, offer clopidogrel with aspirin. Only give prasugrel once PCI intended
Offer systemic unfractionated heparin in catheter laboratory if having PCI
Offer a drug-eluting stent if stenting indicated

*For people aged 75 and over, think about whether bleeding risk with prasugrel outweighs its effectiveness

If follow-on PCI not done, consider angiography findings, comorbidities and risks and benefits when discussing management strategy with the interventional cardiologist, cardiac surgeon and the patient

Assess left ventricular function for NSTEMI
Consider assessing for unstable angina

Cardiac rehabilitation and secondary prevention

This is a summary of the recommendations on early management of unstable angina and NSTEMI from NICE's guideline on acute coronary syndromes. See the guideline at www.nice.org.uk/guidance/NG185

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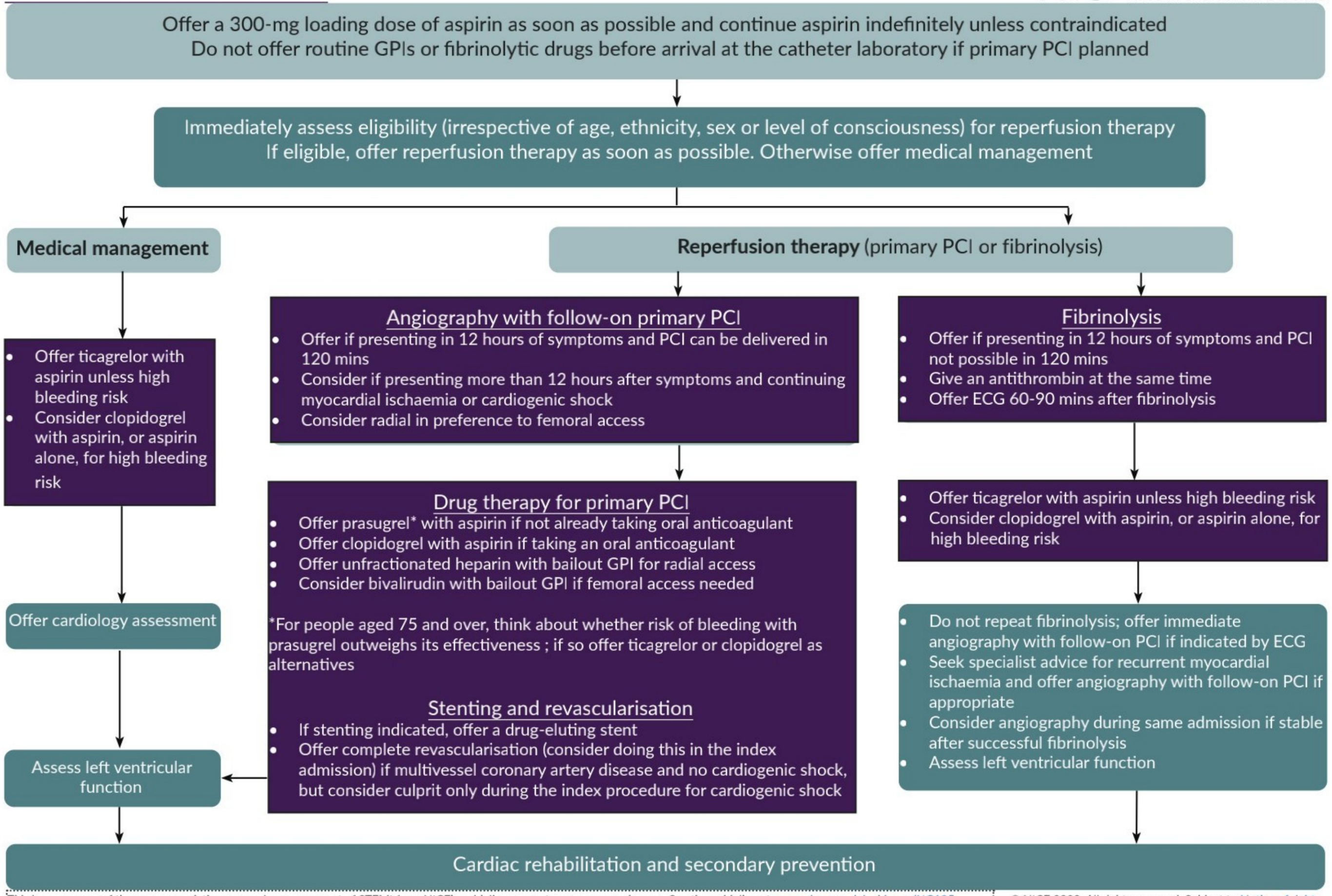
STEMI: early management

NICE National Institute for Health and Care Excellence



Offer a 300-mg loading dose of aspirin as soon as possible and continue aspirin indefinitely unless contraindicated
Do not offer routine GPIs or fibrinolytic drugs before arrival at the catheter laboratory if primary PCI planned

Immediately assess eligibility (irrespective of age, ethnicity, sex or level of consciousness) for reperfusion therapy
If eligible, offer reperfusion therapy as soon as possible. Otherwise offer medical management

Medical management

- Offer ticagrelor with aspirin unless high bleeding risk
- Consider clopidogrel with aspirin, or aspirin alone, for high bleeding risk

Offer cardiology assessment

Assess left ventricular function

Reperfusion therapy (primary PCI or fibrinolysis)

Angiography with follow-on primary PCI

- Offer if presenting in 12 hours of symptoms and PCI can be delivered in 120 mins
- Consider if presenting more than 12 hours after symptoms and continuing myocardial ischaemia or cardiogenic shock
- Consider radial in preference to femoral access

Drug therapy for primary PCI

- Offer prasugrel* with aspirin if not already taking oral anticoagulant
- Offer clopidogrel with aspirin if taking an oral anticoagulant
- Offer unfractionated heparin with bailout GPI for radial access
- Consider bivalirudin with bailout GPI if femoral access needed

*For people aged 75 and over, think about whether risk of bleeding with prasugrel outweighs its effectiveness ; if so offer ticagrelor or clopidogrel as alternatives

Stenting and revascularisation

- If stenting indicated, offer a drug-eluting stent
- Offer complete revascularisation (consider doing this in the index admission) if multivessel coronary artery disease and no cardiogenic shock, but consider culprit only during the index procedure for cardiogenic shock

Fibrinolysis

- Offer if presenting in 12 hours of symptoms and PCI not possible in 120 mins
- Give an antithrombin at the same time
- Offer ECG 60-90 mins after fibrinolysis

- Offer ticagrelor with aspirin unless high bleeding risk
- Consider clopidogrel with aspirin, or aspirin alone, for high bleeding risk

- Do not repeat fibrinolysis; offer immediate angiography with follow-on PCI if indicated by ECG
- Seek specialist advice for recurrent myocardial ischaemia and offer angiography with follow-on PCI if appropriate
- Consider angiography during same admission if stable after successful fibrinolysis
- Assess left ventricular function

Cardiac rehabilitation and secondary prevention

This is a summary of the recommendations on early management of STEMI from NICE's guideline on acute coronary syndromes. See the guideline at www.nice.org.uk/guidance/NG185

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Atrial fibrillation: diagnosis and management

Diagnosis

- Perform manual pulse palpation if atrial fibrillation (AF) is suspected
- Perform a 12-lead ECG in people with an irregular pulse, with or without symptoms, to diagnose AF
- If paroxysmal AF is suspected and not detected on ECG, use a 24-hour ambulatory ECG monitor if episodes <24 hours apart or an ambulatory ECG monitor, event recorder or other ECG technology for an appropriate period if episodes >24 hours apart

Assessment

- Assess stroke risk using the person's CHA$_2$DS$_2$-VASc score
- Assess bleeding risk using the person's ORBIT score. The ORBIT bleeding risk tool has a higher accuracy in predicting absolute bleeding risk than other tools
- Discuss the results and offer monitoring and support to modify risk factors for bleeding
- Perform transthoracic echocardiography (TTE) if a baseline echocardiogram is important for long-term management, cardioversion is being considered, underlying heart disease is suspected or if refinement of clinical risk stratification for antithrombotic therapy is needed
- Do not routinely perform TTE solely for further stroke risk stratification if anticoagulation has already been agreed
- Perform transoesophageal echocardiography (TOE) if TTE shows an abnormality needing further assessment, or if TTE is technically unsuitable and cardiac abnormalities need to be excluded, or if TOE-guided cardioversion is being considered

Stroke prevention

CHA$_2$DS$_2$-VASc ≥ 2
offer oral anticoagulant

CHA$_2$DS$_2$-VASc = 1 in men
consider oral anticoagulant

CHA$_2$DS$_2$-VASc ≤ 1 in women or
CHA$_2$DS$_2$-VASc = 0 in men
do not offer an anticoagulant

Review at age 65 or if the person develops diabetes or cardiovascular comorbidities

Discuss risks and benefits of anticoagulation, including that for most people the benefit of anticoagulation outweighs the bleeding risk.

Direct-acting anticoagulants (DOACs)

- Offer a DOAC as first-choice anticoagulant
- Discuss choice of DOAC, taking into account clinical features, contraindications and the person's preference. Follow guidance in the BNF and the MHRA advice on direct-acting oral anticoagulants
- For people already stable on a vitamin K antagonist, discuss switching at their next routine appointment, taking into account time in therapeutic range (TTR)

Vitamin K antagonists

- Use a vitamin K antagonist if DOACs are contraindicated or not tolerated
- Calculate the person's TTR at each visit. Reassess anticoagulation if poorly controlled (2 INR values >5 or 1 INR value >8 or 2 INR values <1.5 in past 6 months or TTR <65%)
- Take into account and address factors that may contribute to poor control
- Discuss the risks and benefits of alternative stroke prevention strategies with the person

Left atrial appendage occlusion

- If anticoagulation is contraindicated or not tolerated consider left atrial appendage occlusion

- Review anticoagulation at least annually for people taking an anticoagulant and follow the MHRA advice on direct-acting oral anticoagulants
- Review people who are not taking an anticoagulant because of bleeding risk at least annually

Personalised package of care and information
Support with shared decision making and adherence

NICE National Institute for Health and Care Excellence

Published date: April 2021. This is a summary of the advice on diagnosis and management in NICE's guideline on atrial fibrillation. Pages 1 and 3 are new, based on the updated 2021 guidance. Page 2 is taken from the algorithms in the 2014 guideline.

CamScanner

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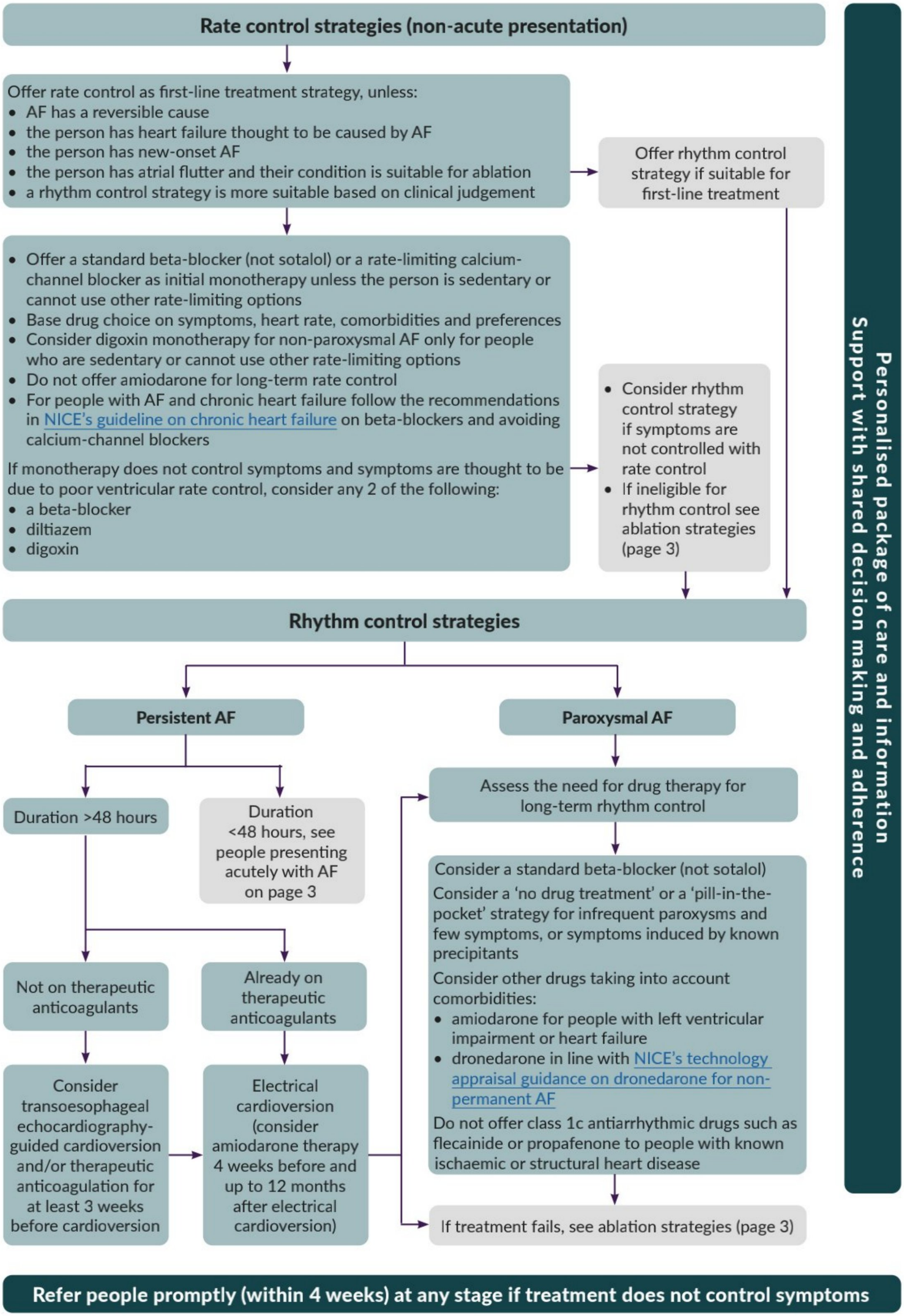

Rate control strategies (non-acute presentation)

Offer rate control as first-line treatment strategy, unless:
- AF has a reversible cause
- the person has heart failure thought to be caused by AF
- the person has new-onset AF
- the person has atrial flutter and their condition is suitable for ablation
- a rhythm control strategy is more suitable based on clinical judgement

Offer rhythm control strategy if suitable for first-line treatment

- Offer a standard beta-blocker (not sotalol) or a rate-limiting calcium-channel blocker as initial monotherapy unless the person is sedentary or cannot use other rate-limiting options
- Base drug choice on symptoms, heart rate, comorbidities and preferences
- Consider digoxin monotherapy for non-paroxysmal AF only for people who are sedentary or cannot use other rate-limiting options
- Do not offer amiodarone for long-term rate control
- For people with AF and chronic heart failure follow the recommendations in NICE's guideline on chronic heart failure on beta-blockers and avoiding calcium-channel blockers

If monotherapy does not control symptoms and symptoms are thought to be due to poor ventricular rate control, consider any 2 of the following:
- a beta-blocker
- diltiazem
- digoxin

- Consider rhythm control strategy if symptoms are not controlled with rate control
- If ineligible for rhythm control see ablation strategies (page 3)

Rhythm control strategies

Persistent AF

Duration >48 hours

Duration <48 hours, see people presenting acutely with AF on page 3

Not on therapeutic anticoagulants

Already on therapeutic anticoagulants

Consider transoesophageal echocardiography-guided cardioversion and/or therapeutic anticoagulation for at least 3 weeks before cardioversion

Electrical cardioversion (consider amiodarone therapy 4 weeks before and up to 12 months after electrical cardioversion)

Paroxysmal AF

Assess the need for drug therapy for long-term rhythm control

Consider a standard beta-blocker (not sotalol)

Consider a 'no drug treatment' or a 'pill-in-the-pocket' strategy for infrequent paroxysms and few symptoms, or symptoms induced by known precipitants

Consider other drugs taking into account comorbidities:
- amiodarone for people with left ventricular impairment or heart failure
- dronedarone in line with NICE's technology appraisal guidance on dronedarone for non-permanent AF

Do not offer class 1c antiarrhythmic drugs such as flecainide or propafenone to people with known ischaemic or structural heart disease

If treatment fails, see ablation strategies (page 3)

Personalised package of care and information

Support with shared decision making and adherence

Refer people promptly (within 4 weeks) at any stage if treatment does not control symptoms

Left atrial ablation and pace and ablate strategies

Symptomatic AF and drug treatment unsuccessful, unsuitable or not tolerated

Left atrial ablation

- Consider radiofrequency point-by-point ablation
- If radiofrequency point-by-point ablation is unsuitable, consider cryoballoon ablation or laser balloon ablation
- Consider left atrial catheter ablation before pacing and atrioventricular node ablation for people with paroxysmal AF or heart failure caused by non-permanent AF
- Discuss the risks and benefits and take into account the person's preferences. Explain that ablation is not always effective or long lasting
- If other cardiac surgery is planned, consider carrying out ablation at the same time
- Consider antiarrhythmic drug treatment (see page 2) after ablation and reassess at 3 months

Pace and ablate

- Consider pacing and atrioventricular node ablation for symptomatic permanent AF or left ventricular dysfunction caused by high ventricular rates
- Reassess symptoms and the need for ablation after pacing and optimising drug treatment

People presenting acutely with AF

New onset AF with life-threatening haemodynamic instability

Carry out emergency electrical cardioversion without delaying to achieve anticoagulation

New onset AF without life-threatening haemodynamic instability

If onset <48 hours offer anticoagulation (see below) and either rate or rhythm control

If onset >48 hours or uncertain offer anticoagulation (see below) and rate control

If rhythm control is agreed, consider either pharmacological or electrical cardioversion

If pharmacological cardioversion is agreed, offer:

- a choice of flecainide or amiodarone if no evidence of structural or ischaemic heart disease
- amiodarone if evidence of structural heart disease

If acute decompensated heart failure is suspected, seek senior specialist input on using beta-blockers and do not use calcium-channel blockers

Anticoagulation for acute presentation of AF

In people with new onset AF who are receiving no or subtherapeutic anticoagulation therapy, offer heparin at initial presentation and continue until stroke and bleeding risk are assessed (see page 1)

If onset <48 hours, offer oral anticoagulation if:

- stable sinus rhythm is not successfully restored within the same 48 hours after onset or
- there are factors indicating a high risk of recurrence or
- it is recommended after assessment of stroke and bleeding risks (see page 1)

If onset >48 hours and long-term rhythm control is being considered, delay cardioversion until maintained on therapeutic anticoagulation for at least 3 weeks and offer rate control during this time

If there is uncertainty over the time since onset, offer oral anticoagulation (see page 1)

Personalised package of care and information

Support with shared decision making and adherence

Refer people promptly (within 4 weeks) at any stage if treatment does not control symptoms

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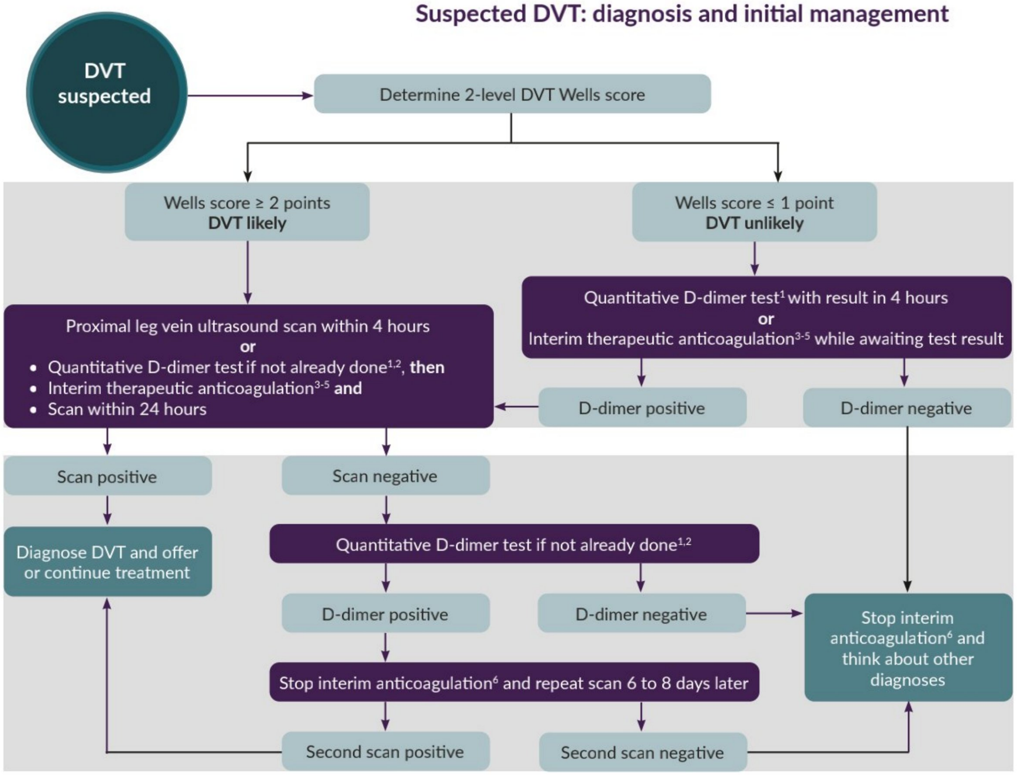
Venous thromboembolism: diagnosis and anticoagulation treatment

NICE National Institute for Health and Care Excellence

Suspected DVT: diagnosis and initial management



DVT suspected

Determine 2-level DVT Wells score

Wells score ≥ 2 points
DVT likely

Wells score ≤ 1 point
DVT unlikely

Proximal leg vein ultrasound scan within 4 hours
or
- Quantitative D-dimer test if not already done[1,2], **then**
- Interim therapeutic anticoagulation[3-5] **and**
- Scan within 24 hours

Quantitative D-dimer test[1] with result in 4 hours
or
Interim therapeutic anticoagulation[3-5] while awaiting test result

D-dimer positive

D-dimer negative

Scan positive

Scan negative

Diagnose DVT and offer or continue treatment

Quantitative D-dimer test if not already done[1,2]

D-dimer positive

D-dimer negative

Stop interim anticoagulation[6] and think about other diagnoses

Stop interim anticoagulation[6] and repeat scan 6 to 8 days later

Second scan positive

Second scan negative

2-level DVT Wells score

Clinical feature	Points
Active cancer (treatment ongoing, within 6 months, or palliative)	1
Paralysis, paresis or recent plaster immobilisation of lower extremities	1
Recently bedridden for 3 days or more, or major surgery within 12 weeks requiring general or regional anaesthesia	1
Localised tenderness along the distribution of the deep venous system	1
Entire leg swollen	1
Calf swelling at least 3 cm larger than asymptomatic side	1
Pitting oedema confined to the symptomatic leg	1
Collateral superficial veins (non-varicose)	1
Previously documented DVT	1
An alternative diagnosis is at least as likely as DVT	-2
DVT likely: 2 points or more DVT unlikely: 1 point or less	

Adapted with permission from Wells et al. (2003)

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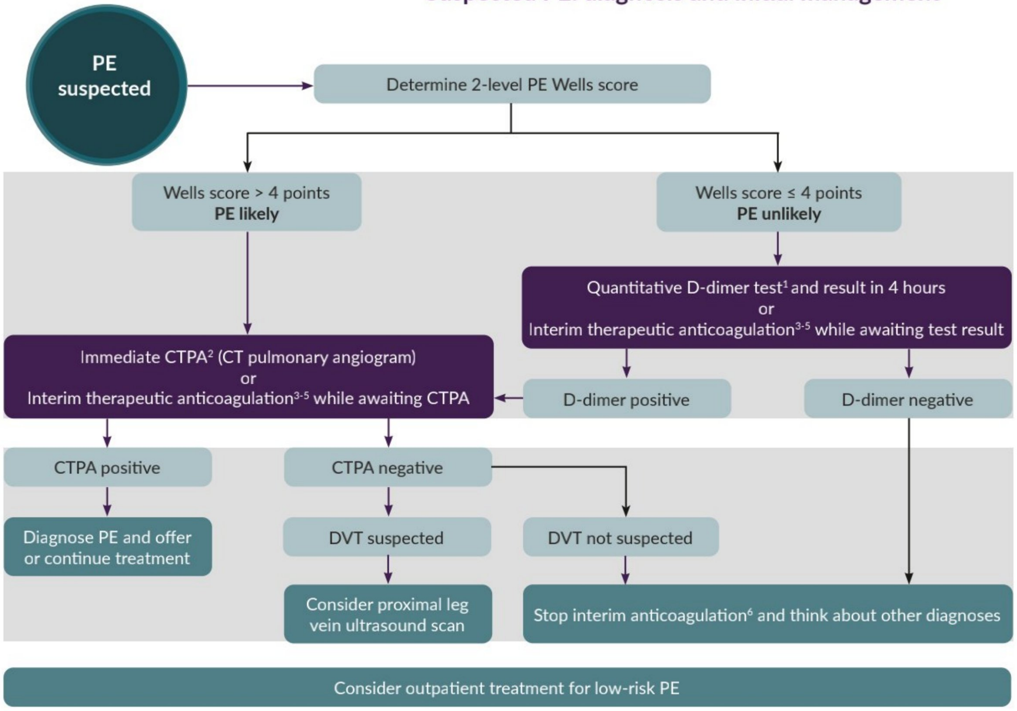
[1] Laboratory or point-of-care test. Consider age-adjusted threshold for people over 50
[2] Note that only one D-dimer test is needed during diagnosis
[3] Measure baseline blood count, renal and hepatic function, PT and APTT but start anticoagulation before results available and review within 24 hours
[4] If possible, choose an anticoagulant that can be continued if DVT confirmed
[5] Direct-acting anticoagulants and some LMWHs are off label for use in suspected DVT. Follow GMC guidance on prescribing unlicensed medicines
[6] This refers to interim therapeutic anticoagulation only. Do not stop long-term anticoagulation for secondary prevention.

This is a summary of the recommendations on diagnosis and management from NICE's guideline on venous thromboembolic diseases. See the original guidance at www.nice.org.uk/guidance/NG158

Suspected PE: diagnosis and initial management


PE suspected
Determine 2-level PE Wells score
Wells score > 4 points
PE likely
Wells score ≤ 4 points
PE unlikely
Quantitative D-dimer test¹ and result in 4 hours
or
Interim therapeutic anticoagulation³⁻⁵ while awaiting test result
Immediate CTPA² (CT pulmonary angiogram)
or
Interim therapeutic anticoagulation³⁻⁵ while awaiting CTPA
D-dimer positive
D-dimer negative
CTPA positive
CTPA negative
Diagnose PE and offer or continue treatment
DVT suspected
DVT not suspected
Consider proximal leg vein ultrasound scan
Stop interim anticoagulation⁶ and think about other diagnoses
Consider outpatient treatment for low-risk PE

2-level PE Wells score

Clinical feature	Points
Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)	3
An alternative diagnosis is less likely than PE	3
Heart rate more than 100 beats per minute	1.5
Immobilisation for more than 3 days or surgery in previous 4 weeks	1.5
Previous DVT/PE	1.5
Haemoptysis	1
Malignancy (on treatment, treated in the last 6 months, or palliative)	1
PE likely: More than 4 points PE unlikely: 4 points or less	

Adapted with permission from Wells et al. (2000)

[1] Laboratory or point-of-care test. Consider age-adjusted threshold for people over 50

[2] CT pulmonary angiogram. Assess suitability of V/Q SPECT or V/Q planar scan for allergy, severe renal impairment (CrCl <30 ml/min estimated using the Cockcroft and Gault formula; see the BNF) or high irradiation risk

[3] Measure baseline blood count, renal and hepatic function, PT and APTT but start anticoagulation before results are available and review within 24 hours

[4] If possible, choose an anticoagulant that can be continued if PE is confirmed

[5] Direct-acting anticoagulants and some LMWHs are off label for use in suspected DVT. Follow GMC guidance on prescribing unlicensed medicines

[6] This refers to interim therapeutic anticoagulation only. Do not stop long-term anticoagulation for secondary prevention.

DVT or PE: anticoagulation

PE with haemodynamic instability

Offer continuous UFH infusion and consider thrombolytic therapy

Body weight

If body weight <50 kg or >120 kg consider anticoagulant with monitoring of therapeutic levels.

Note cautions and requirements for dose adjustments and monitoring in SPCs. Follow local protocols, or specialist or MDT advice

INR monitoring

Do not routinely offer self-management or self-monitoring of INR

Prescribing in renal impairment and active cancer

Some LMWHs are off label in renal impairment, and most anticoagulants are off label in active cancer.

Follow GMC guidance on prescribing unlicensed medicines

Treatment failure

If anticoagulation treatment fails:

- check adherence
- address other sources of hypercoagulability
- increase the dose or change to an anticoagulant with a different mode of action

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- Measure baseline full blood count, renal and hepatic function, PT and APTT but start anticoagulation before results available. Review and if necessary act on results within 24 hours
- Offer anticoagulation for at least 3 months. Take into account contraindications, comorbidities and the person's preferences
- After 3 months (3 to 6 months for active cancer) assess and discuss the benefits and risks of continuing, stopping or changing the anticoagulant with the person. See long-term anticoagulation for secondary prevention in the guideline

No renal impairment, active cancer, antiphospholipid syndrome or haemodynamic instability	**Renal impairment** (CrCl estimated using the Cockcroft and Gault formula; see the BNF)	**Active cancer** (receiving antimitotic treatment, diagnosed in past 6 months, recurrent, metastatic or inoperable)	**Antiphospholipid syndrome** (triple positive, established diagnosis)
Offer apixaban or rivaroxaban If neither suitable, offer one of: • LMWH for at least 5 days followed by dabigatran or edoxaban • LMWH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone	CrCl 15 to 50 ml/min, offer one of: • apixaban • rivaroxaban • LMWH for at least 5 days then – edoxaban **or** – dabigatran if CrCl ≥ 30 ml/min • LMWH or UFH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone CrCl < 15 ml/min, offer one of: • LMWH • UFH • LMWH or UFH and a VKA for at least 5 days, or until INR at least 2.0 on 2 consecutive readings, then a VKA alone Note cautions and requirements for dose adjustments and monitoring in SPCs. Follow local protocols, or specialist or MDT advice	Consider a DOAC If a DOAC is not suitable, consider one of: • LMWH • LMWH and a VKA for at least 5 days or until INR at least 2.0 on 2 consecutive readings, then a VKA alone Offer anticoagulation for 3 to 6 months Take into account tumour site, drug interactions including cancer drugs, and bleeding risk	Offer LMWH and a VKA for at least 5 days or until INR at least 2.0 on 2 consecutive readings, then a VKA alone

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Atrial fibrillation: diagnosis and management

Diagnosis

- Perform manual pulse palpation if atrial fibrillation (AF) is suspected
- Perform a 12-lead ECG in people with an irregular pulse, with or without symptoms, to diagnose AF
- If paroxysmal AF is suspected and not detected on ECG, use a 24-hour ambulatory ECG monitor if episodes <24 hours apart or an ambulatory ECG monitor, event recorder or other ECG technology for an appropriate period if episodes >24 hours apart

Assessment

- Assess stroke risk using the person's CHA_2DS_2-VASc score
- Assess bleeding risk using the person's ORBIT score. The ORBIT bleeding risk tool has a higher accuracy in predicting absolute bleeding risk than other tools
- Discuss the results and offer monitoring and support to modify risk factors for bleeding
- Perform transthoracic echocardiography (TTE) if a baseline echocardiogram is important for long-term management, cardioversion is being considered, underlying heart disease is suspected or if refinement of clinical risk stratification for antithrombotic therapy is needed
- Do not routinely perform TTE solely for further stroke risk stratification if anticoagulation has already been agreed
- Perform transoesophageal echocardiography (TOE) if TTE shows an abnormality needing further assessment, or if TTE is technically unsuitable and cardiac abnormalities need to be excluded, or if TOE-guided cardioversion is being considered

Stroke prevention

CHA_2DS_2-VASc ≥ 2
offer oral anticoagulant

CHA_2DS_2-VASc = 1 in men
consider oral anticoagulant

CHA_2DS_2-VASc ≤ 1 in women or
CHA_2DS_2-VASc = 0 in men
do not offer an anticoagulant

Review at age 65 or if the person develops diabetes or cardiovascular comorbidities

Discuss risks and benefits of anticoagulation, including that for most people the benefit of anticoagulation outweighs the bleeding risk.

Direct-acting anticoagulants (DOACs)

- Offer a DOAC as first-choice anticoagulant
- Discuss choice of DOAC, taking into account clinical features, contraindications and the person's preference. Follow guidance in the BNF and the MHRA advice on direct-acting oral anticoagulants
- For people already stable on a vitamin K antagonist, discuss switching at their next routine appointment, taking into account time in therapeutic range (TTR)

Vitamin K antagonists

- Use a vitamin K antagonist if DOACs are contraindicated or not tolerated
- Calculate the person's TTR at each visit. Reassess anticoagulation if poorly controlled (2 INR values >5 or 1 INR value >8 or 2 INR values <1.5 in past 6 months or TTR <65%)
- Take into account and address factors that may contribute to poor control
- Discuss the risks and benefits of alternative stroke prevention strategies with the person

Left atrial appendage occlusion

- If anticoagulation is contraindicated or not tolerated consider left atrial appendage occlusion

- Review anticoagulation at least annually for people taking an anticoagulant and follow the MHRA advice on direct-acting oral anticoagulants
- Review people who are not taking an anticoagulant because of bleeding risk at least annually

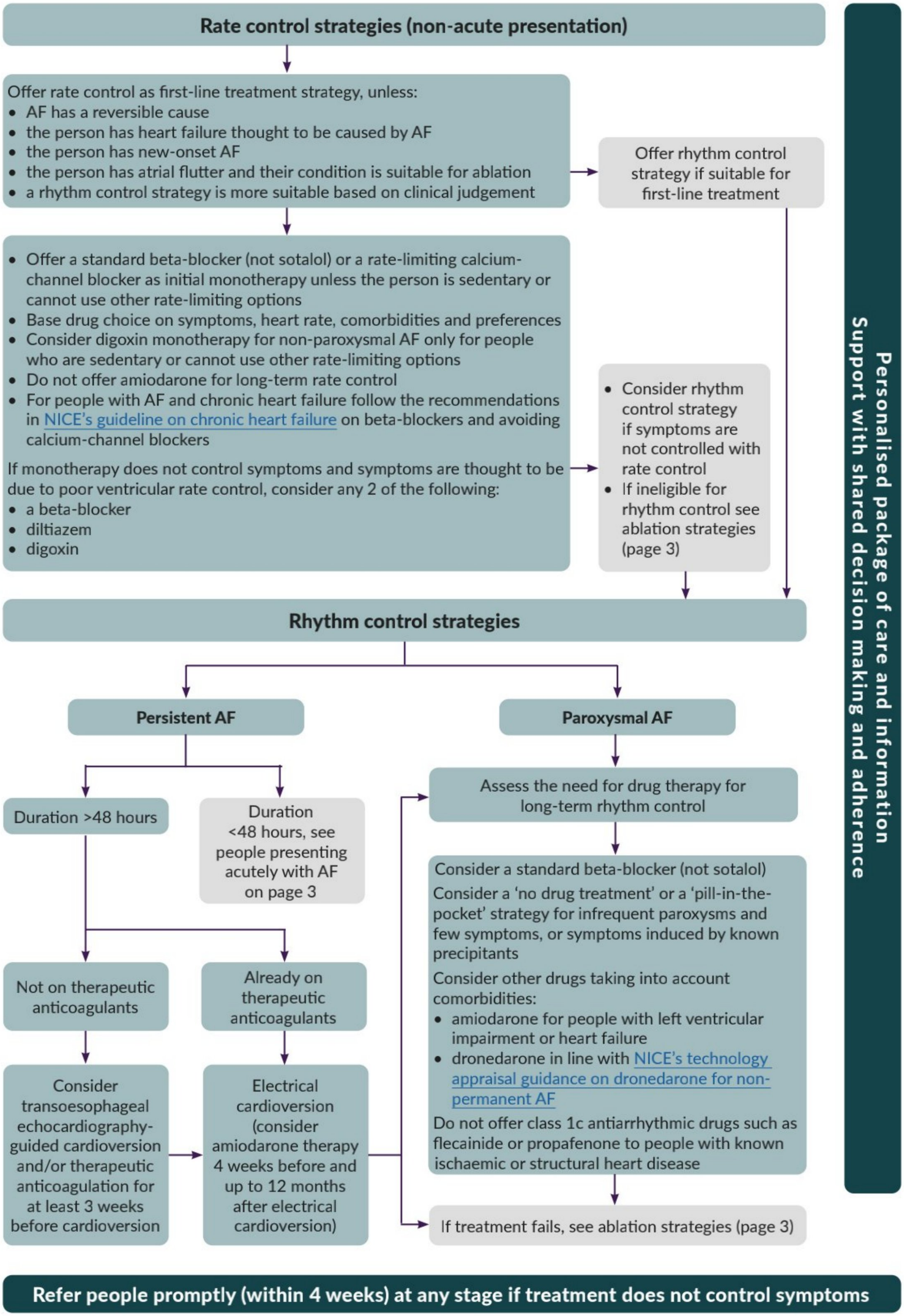
Personalised package of care and information
Support with shared decision making and adherence

NICE National Institute for Health and Care Excellence

Published date: April 2021. This is a summary of the advice on diagnosis and management in NICE's guideline on atrial fibrillation. Pages 1 and 3 are new, based on the updated 2021 guidance. Page 2 is taken from the algorithms in the 2014 guideline.

CamScanner

CS CamScanner



Rate control strategies (non-acute presentation)

Offer rate control as first-line treatment strategy, unless:
- AF has a reversible cause
- the person has heart failure thought to be caused by AF
- the person has new-onset AF
- the person has atrial flutter and their condition is suitable for ablation
- a rhythm control strategy is more suitable based on clinical judgement

Offer rhythm control strategy if suitable for first-line treatment

- Offer a standard beta-blocker (not sotalol) or a rate-limiting calcium-channel blocker as initial monotherapy unless the person is sedentary or cannot use other rate-limiting options
- Base drug choice on symptoms, heart rate, comorbidities and preferences
- Consider digoxin monotherapy for non-paroxysmal AF only for people who are sedentary or cannot use other rate-limiting options
- Do not offer amiodarone for long-term rate control
- For people with AF and chronic heart failure follow the recommendations in NICE's guideline on chronic heart failure on beta-blockers and avoiding calcium-channel blockers

If monotherapy does not control symptoms and symptoms are thought to be due to poor ventricular rate control, consider any 2 of the following:
- a beta-blocker
- diltiazem
- digoxin

- Consider rhythm control strategy if symptoms are not controlled with rate control
- If ineligible for rhythm control see ablation strategies (page 3)

Rhythm control strategies

Persistent AF

Duration >48 hours

Duration <48 hours, see people presenting acutely with AF on page 3

Not on therapeutic anticoagulants

Already on therapeutic anticoagulants

Consider transoesophageal echocardiography-guided cardioversion and/or therapeutic anticoagulation for at least 3 weeks before cardioversion

Electrical cardioversion (consider amiodarone therapy 4 weeks before and up to 12 months after electrical cardioversion)

Paroxysmal AF

Assess the need for drug therapy for long-term rhythm control

Consider a standard beta-blocker (not sotalol)

Consider a 'no drug treatment' or a 'pill-in-the-pocket' strategy for infrequent paroxysms and few symptoms, or symptoms induced by known precipitants

Consider other drugs taking into account comorbidities:
- amiodarone for people with left ventricular impairment or heart failure
- dronedarone in line with NICE's technology appraisal guidance on dronedarone for non-permanent AF

Do not offer class 1c antiarrhythmic drugs such as flecainide or propafenone to people with known ischaemic or structural heart disease

If treatment fails, see ablation strategies (page 3)

Personalised package of care and information
Support with shared decision making and adherence

Refer people promptly (within 4 weeks) at any stage if treatment does not control symptoms

Left atrial ablation and pace and ablate strategies

Symptomatic AF and drug treatment unsuccessful, unsuitable or not tolerated

Left atrial ablation

- Consider radiofrequency point-by-point ablation
- If radiofrequency point-by-point ablation is unsuitable, consider cryoballoon ablation or laser balloon ablation
- Consider left atrial catheter ablation before pacing and atrioventricular node ablation for people with paroxysmal AF or heart failure caused by non-permanent AF
- Discuss the risks and benefits and take into account the person's preferences. Explain that ablation is not always effective or long lasting
- If other cardiac surgery is planned, consider carrying out ablation at the same time
- Consider antiarrhythmic drug treatment (see page 2) after ablation and reassess at 3 months

Pace and ablate

- Consider pacing and atrioventricular node ablation for symptomatic permanent AF or left ventricular dysfunction caused by high ventricular rates
- Reassess symptoms and the need for ablation after pacing and optimising drug treatment

People presenting acutely with AF

New onset AF with life-threatening haemodynamic instability

Carry out emergency electrical cardioversion without delaying to achieve anticoagulation

New onset AF without life-threatening haemodynamic instability

If onset <48 hours offer anticoagulation (see below) and either rate or rhythm control

If onset >48 hours or uncertain offer anticoagulation (see below) and rate control

If rhythm control is agreed, consider either pharmacological or electrical cardioversion

If pharmacological cardioversion is agreed, offer:

- a choice of flecainide or amiodarone if no evidence of structural or ischaemic heart disease
- amiodarone if evidence of structural heart disease

If acute decompensated heart failure is suspected, seek senior specialist input on using beta-blockers and do not use calcium-channel blockers

Anticoagulation for acute presentation of AF

In people with new onset AF who are receiving no or subtherapeutic anticoagulation therapy, offer heparin at initial presentation and continue until stroke and bleeding risk are assessed (see page 1)

If onset <48 hours, offer oral anticoagulation if:

- stable sinus rhythm is not successfully restored within the same 48 hours after onset or
- there are factors indicating a high risk of recurrence or
- it is recommended after assessment of stroke and bleeding risks (see page 1)

If onset >48 hours and long-term rhythm control is being considered, delay cardioversion until maintained on therapeutic anticoagulation for at least 3 weeks and offer rate control during this time

If there is uncertainty over the time since onset, offer oral anticoagulation (see page 1)

Personalised package of care and information

Support with shared decision making and adherence

Refer people promptly (within 4 weeks) at any stage if treatment does not control symptoms

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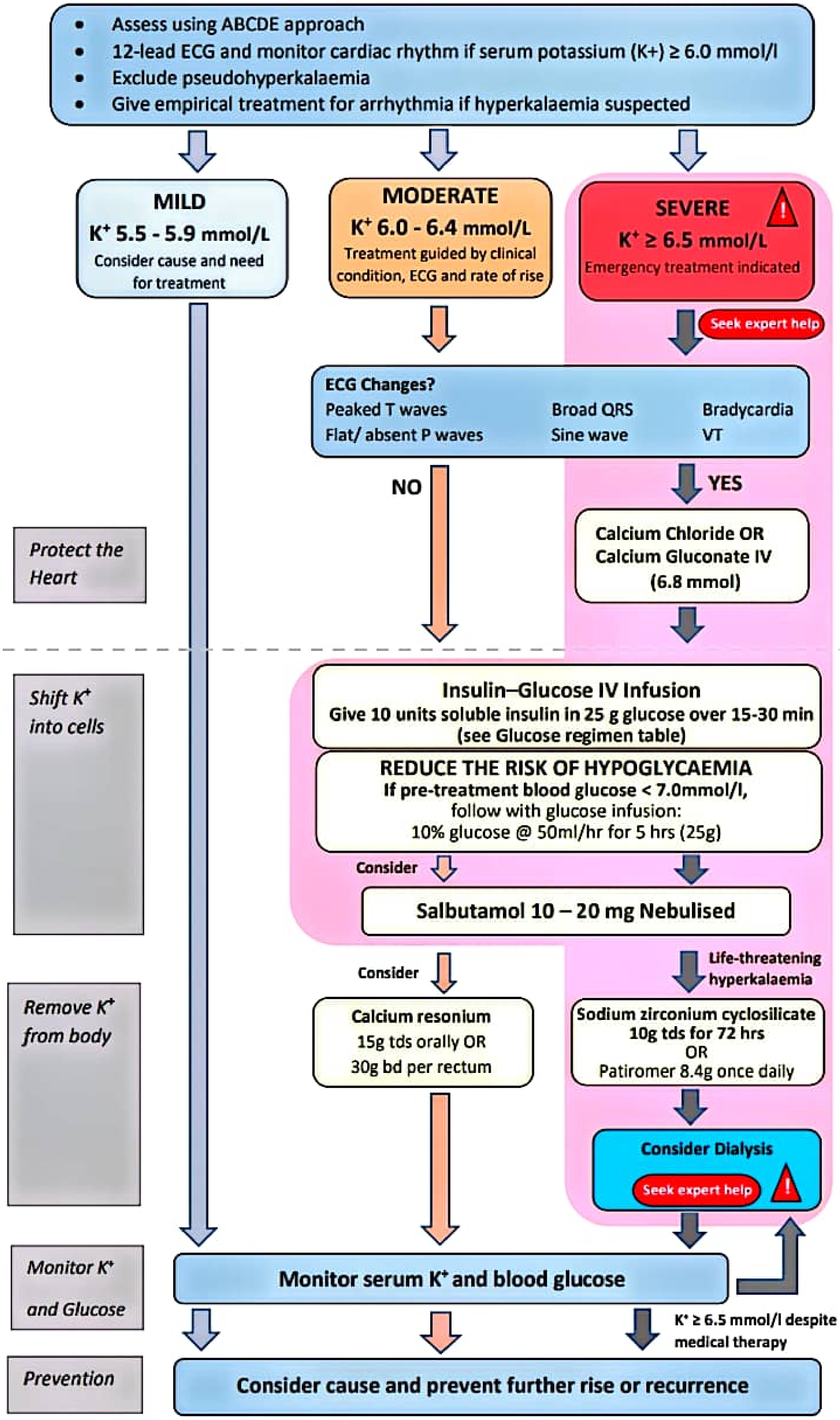
Emergency Management of Hyperkalaemia in Adults



- Assess using ABCDE approach
- 12-lead ECG and monitor cardiac rhythm if serum potassium (K+) ≥ 6.0 mmol/l
- Exclude pseudohyperkalaemia
- Give empirical treatment for arrhythmia if hyperkalaemia suspected

MILD
K^+ 5.5 - 5.9 mmol/L
Consider cause and need for treatment

MODERATE
K^+ 6.0 - 6.4 mmol/L
Treatment guided by clinical condition, ECG and rate of rise

SEVERE
$K^+ \geq$ 6.5 mmol/L
Emergency treatment indicated

Seek expert help

ECG Changes?
Peaked T waves | Broad QRS | Bradycardia
Flat/ absent P waves | Sine wave | VT

NO

YES

Protect the Heart

Calcium Chloride OR Calcium Gluconate IV (6.8 mmol)

Shift K^+ into cells

Insulin–Glucose IV Infusion
Give 10 units soluble insulin in 25 g glucose over 15-30 min
(see Glucose regimen table)

REDUCE THE RISK OF HYPOGLYCAEMIA
If pre-treatment blood glucose < 7.0mmol/l,
follow with glucose infusion:
10% glucose @ 50ml/hr for 5 hrs (25g)

Consider

Salbutamol 10 – 20 mg Nebulised

Remove K^+ from body

Consider

Calcium resonium
15g tds orally OR
30g bd per rectum

Life-threatening hyperkalaemia

Sodium zirconium cyclosilicate
10g tds for 72 hrs
OR
Patiromer 8.4g once daily

Consider Dialysis
Seek expert help

Monitor K^+ and Glucose

Monitor serum K^+ and blood glucose

$K^+ \geq$ 6.5 mmol/l despite medical therapy

Prevention

Consider cause and prevent further rise or recurrence

Date: ___/___/___ Time ___:____

First 15-30 minutes

Na^+:	______	pH	___.___
K^+:	___.___	pCO_2	___.___
Urea:	___.___	pO_2:	___.___
Creat:	______	Bicarb :	______

Use ABG machine to monitor K^+

IV Calcium (6.8 mmol)

10 ml 10% Calcium Chloride IV OR

30 ml 10% Calcium Gluconate IV

Use large IV access and give over 5 min

Repeat ECG

Consider further dose after 5 min if ECG changes

Next 30-60 minutes

GLUCOSE REGIMEN (25g glucose)
= 50ml 50% glucose
= 125ml 20% glucose
= 250ml 10% glucose

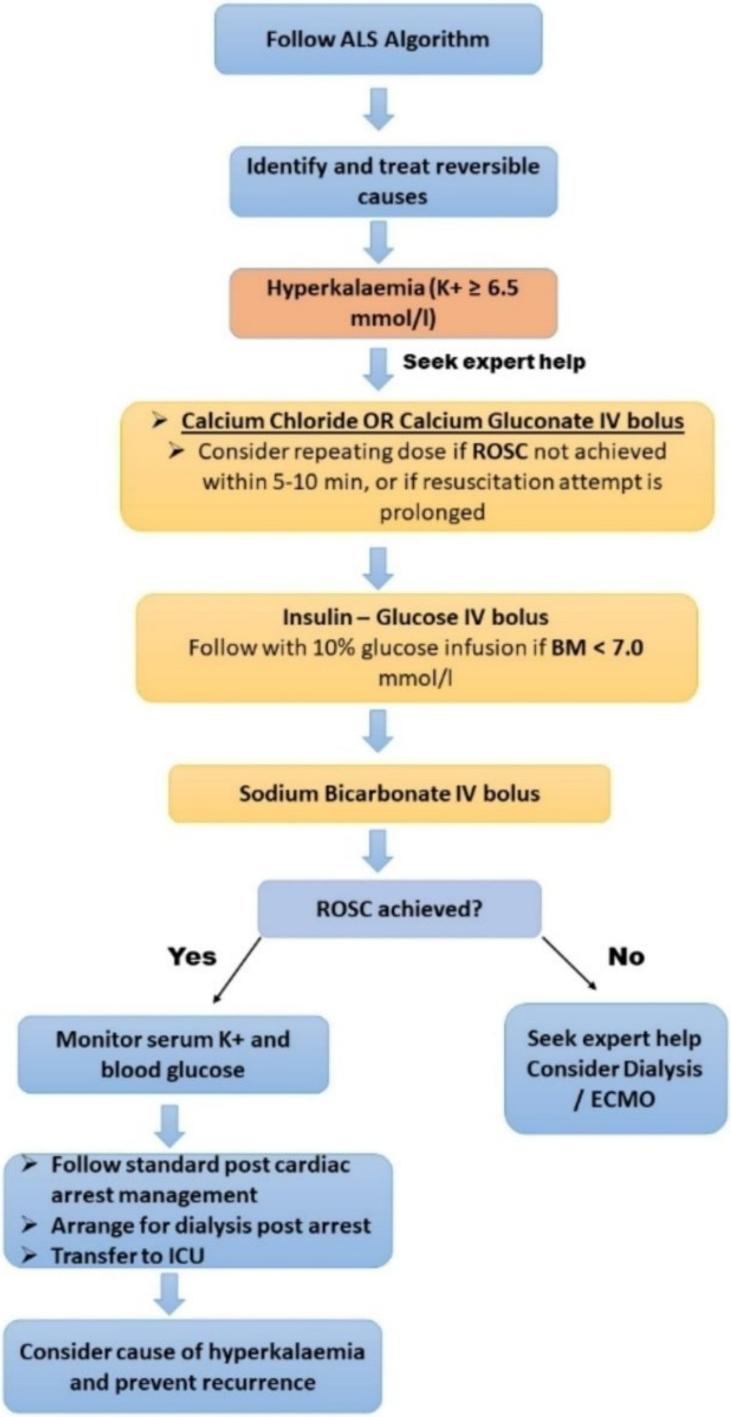
Blood Monitoring:

	Glucose	K^+
Baseline	___.___	___.___
30 min	___.___	
60 min	___.___	___.___
90 min	___.___	
120 min	___.___	___.___
180 min	___.___	
240 min	___.___	___.___
300 min	___.___	
360 min	___.___	___.___
480 min	___.___	
720 min	___.___	___.___

K^+: potassium; Na^+: sodium; Creat: creatinine; Bicarb: bicarbonate; max - maximum

Publication Date: 1.7.2020 Review Date: 1.7.2025 The Renal Association UK

Management of Hyperkalaemic Cardiac Arrest


Follow ALS Algorithm

Identify and treat reversible causes

Hyperkalaemia (K+ ≥ 6.5 mmol/l)

- Calcium Chloride OR Calcium Gluconate IV bolus
- Consider repeating dose if **ROSC** not achieved within 5-10 min, or if resuscitation attempt is prolonged

Insulin – Glucose IV bolus
Follow with 10% glucose infusion if **BM < 7.0** mmol/l

Sodium Bicarbonate IV bolus

ROSC achieved?

Monitor serum K+ and blood glucose

- Follow standard post cardiac arrest management
- Arrange for dialysis post arrest
- Transfer to ICU

Consider cause of hyperkalaemia and prevent recurrence

Seek expert help
Consider Dialysis / ECMO

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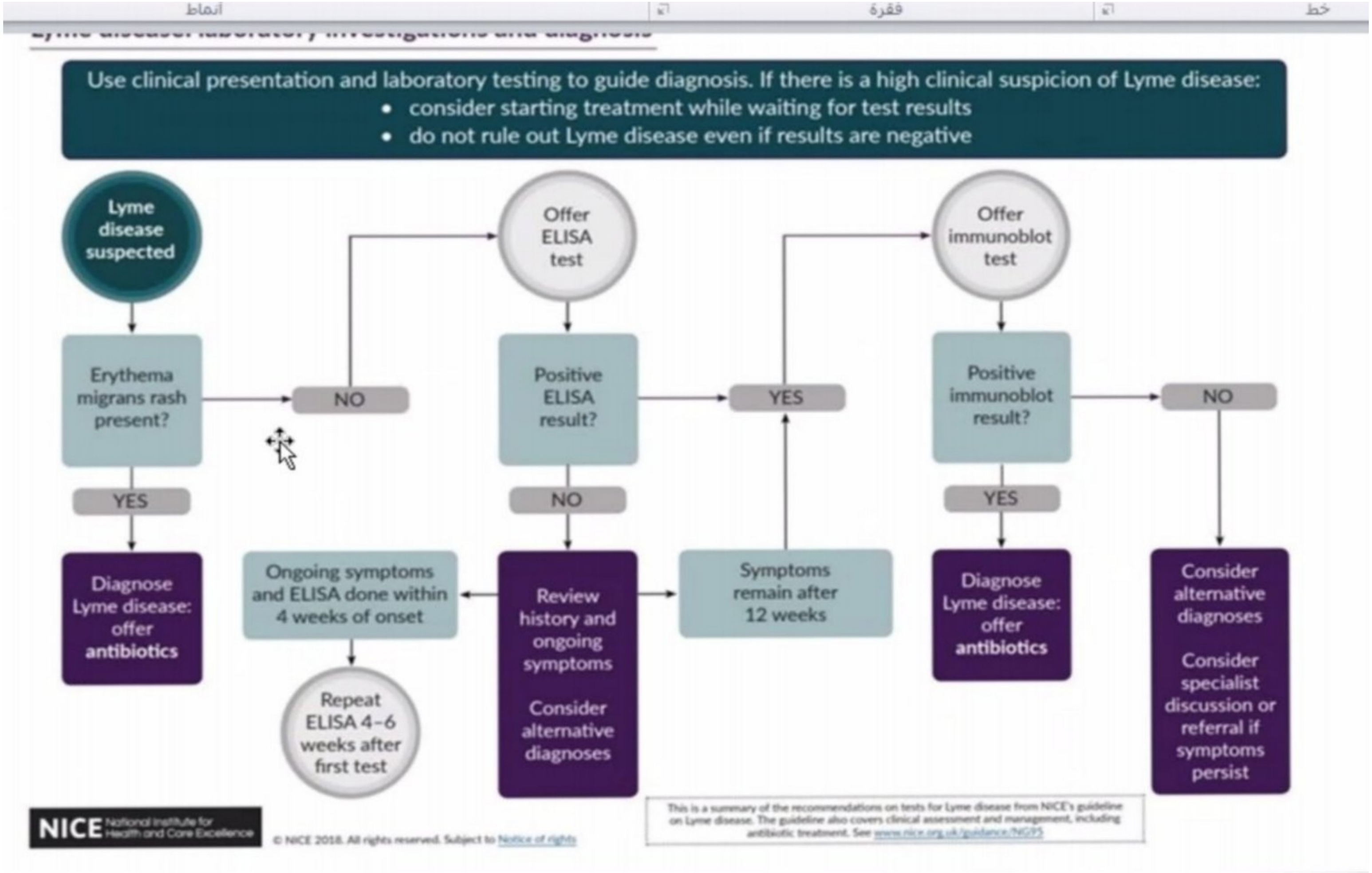

Lyme disease: laboratory investigations and diagnosis

Use clinical presentation and laboratory testing to guide diagnosis. If there is a high clinical suspicion of Lyme disease:

- consider starting treatment while waiting for test results
- do not rule out Lyme disease even if results are negative

Lyme disease suspected

Erythema migrans rash present?

YES

Diagnose Lyme disease: offer **antibiotics**

NO

Offer ELISA test

Positive ELISA result?

YES

NO

Review history and ongoing symptoms

Consider alternative diagnoses

Ongoing symptoms and ELISA done within 4 weeks of onset

Repeat ELISA 4–6 weeks after first test

Symptoms remain after 12 weeks

YES

Offer immunoblot test

Positive immunoblot result?

YES

Diagnose Lyme disease: offer **antibiotics**

NO

Consider alternative diagnoses

Consider specialist discussion or referral if symptoms persist

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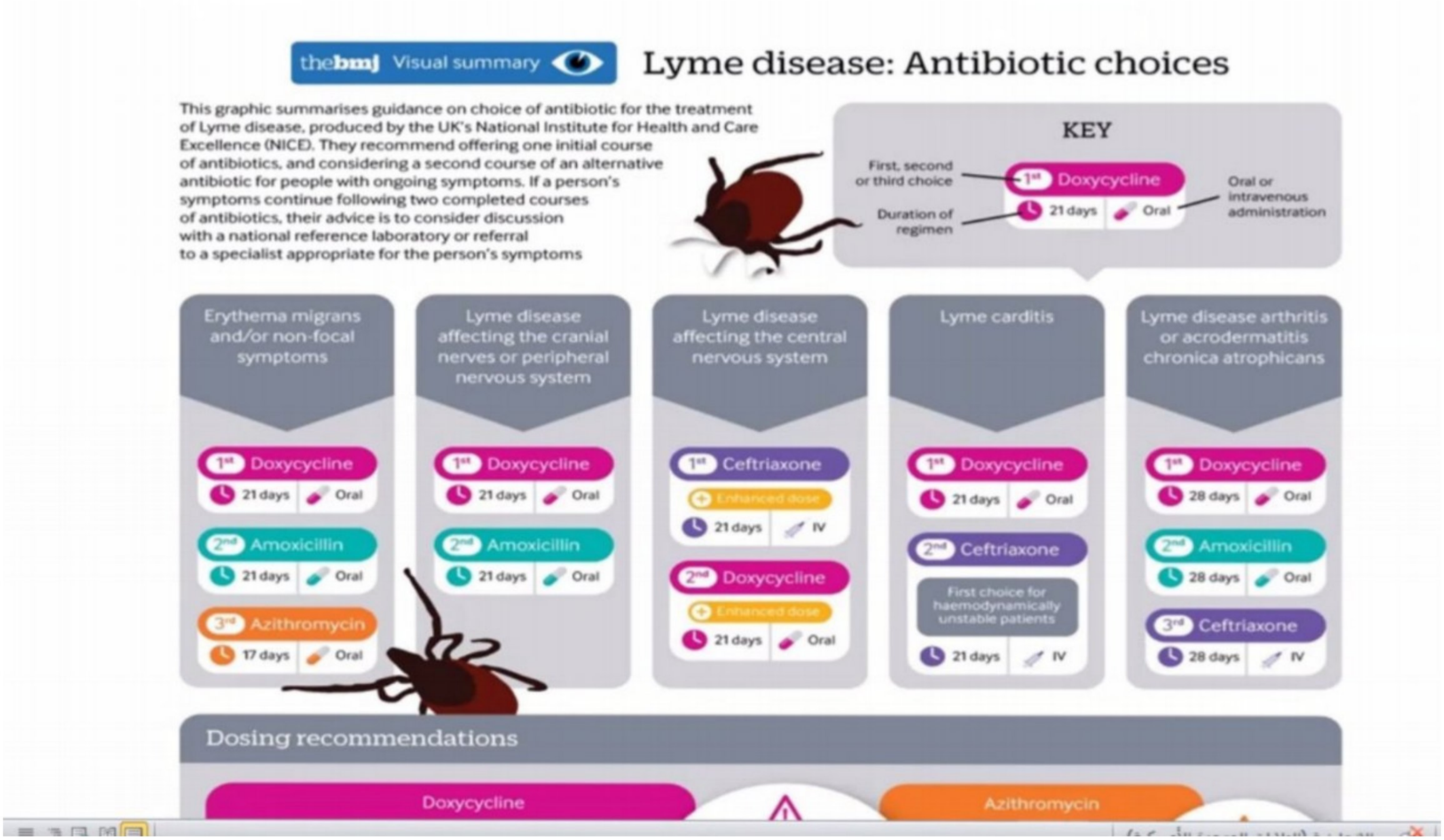
This is a summary of the recommendations on tests for Lyme disease from NICE's guideline on Lyme disease. The guideline also covers clinical assessment and management, including antibiotic treatment. See www.nice.org.uk/guidance/NG95



thebmj Visual summary

Lyme disease: Antibiotic choices

This graphic summarises guidance on choice of antibiotic for the treatment of Lyme disease, produced by the UK's National Institute for Health and Care Excellence (NICE). They recommend offering one initial course of antibiotics, and considering a second course of an alternative antibiotic for people with ongoing symptoms. If a person's symptoms continue following two completed courses of antibiotics, their advice is to consider discussion with a national reference laboratory or referral to a specialist appropriate for the person's symptoms

KEY

First, second or third choice — 1st Doxycycline — Oral or intravenous administration

Duration of regimen — 21 days — Oral

Erythema migrans and/or non-focal symptoms	Lyme disease affecting the cranial nerves or peripheral nervous system	Lyme disease affecting the central nervous system	Lyme carditis	Lyme disease arthritis or acrodermatitis chronica atrophicans
1st Doxycycline 21 days · Oral	1st Doxycycline 21 days · Oral	1st Ceftriaxone Enhanced dose 21 days · IV	1st Doxycycline 21 days · Oral	1st Doxycycline 28 days · Oral
2nd Amoxicillin 21 days · Oral	2nd Amoxicillin 21 days · Oral	2nd Doxycycline Enhanced dose 21 days · Oral	2nd Ceftriaxone First choice for haemodynamically unstable patients 21 days · IV	2nd Amoxicillin 28 days · Oral
3rd Azithromycin 17 days · Oral				3rd Ceftriaxone 28 days · IV

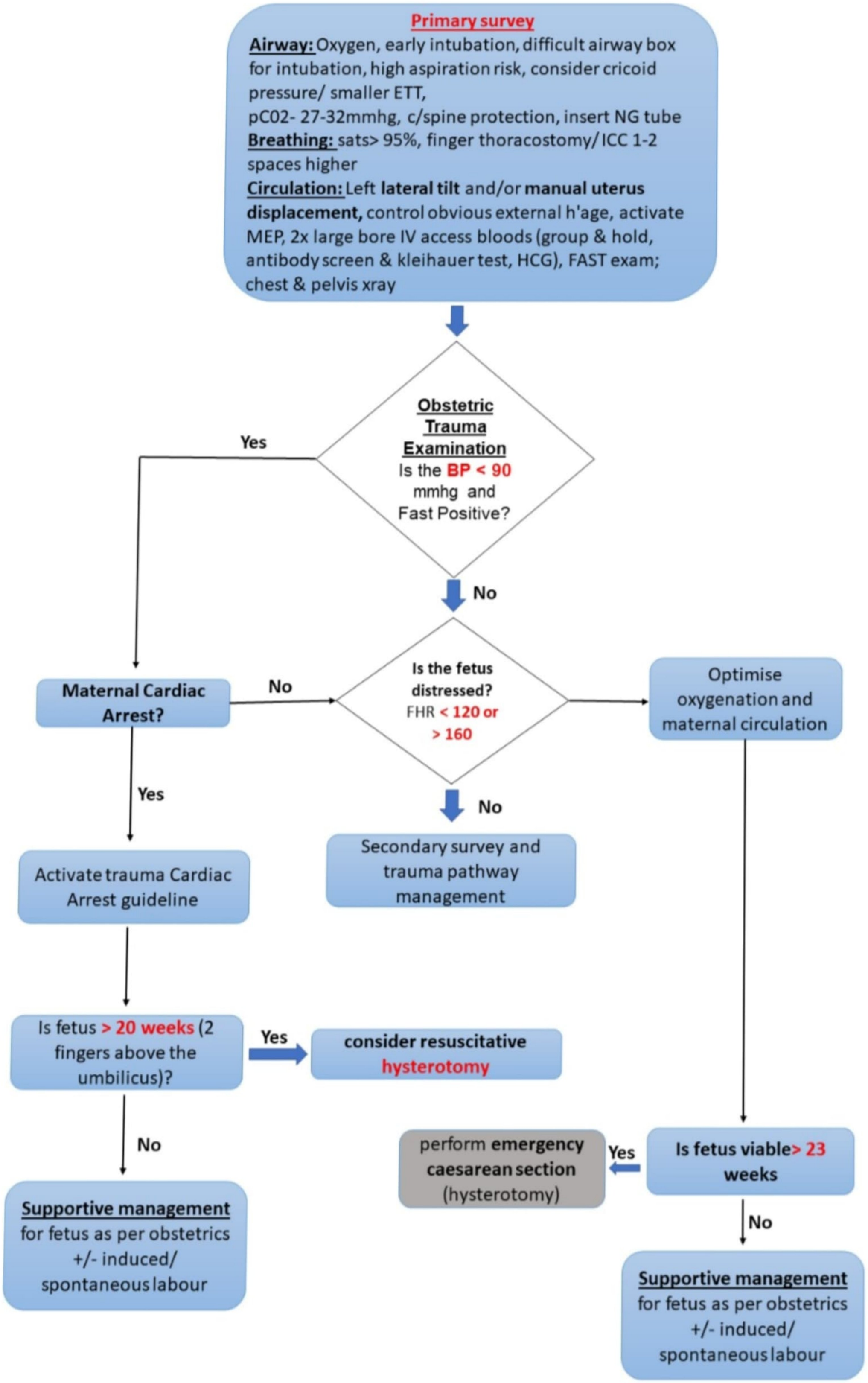
Dosing recommendations

Doxycycline

Azithromycin

- # Pregnancy trauma management
- ## Pregnant Trauma Patient primary Survey

Pregnant trauma patient (>20 weeks gestation)



Primary survey

Airway: Oxygen, early intubation, difficult airway box for intubation, high aspiration risk, consider cricoid pressure/ smaller ETT,
pC02- 27-32mmhg, c/spine protection, insert NG tube

Breathing: sats> 95%, finger thoracostomy/ ICC 1-2 spaces higher

Circulation: Left **lateral tilt** and/or **manual uterus displacement,** control obvious external h'age, activate MEP, 2x large bore IV access bloods (group & hold, antibody screen & kleihauer test, HCG), FAST exam; chest & pelvis xray

Obstetric Trauma Examination
Is the BP < 90 mmhg and Fast Positive?
Yes
No
Maternal Cardiac Arrest?
No
Is the fetus distressed? FHR < 120 or > 160
Optimise oxygenation and maternal circulation
Yes
No
Activate trauma Cardiac Arrest guideline
Secondary survey and trauma pathway management
Is fetus > 20 weeks (2 fingers above the umbilicus)?
Yes
consider resuscitative hysterotomy
No
Supportive management for fetus as per obstetrics +/- induced/ spontaneous labour
perform emergency caesarean section (hysterotomy)
Yes
Is fetus viable> 23 weeks
No
Supportive management for fetus as per obstetrics +/- induced/ spontaneous labour

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- **Pregnant Trauma Patient Secondary and Tertiary Survey**

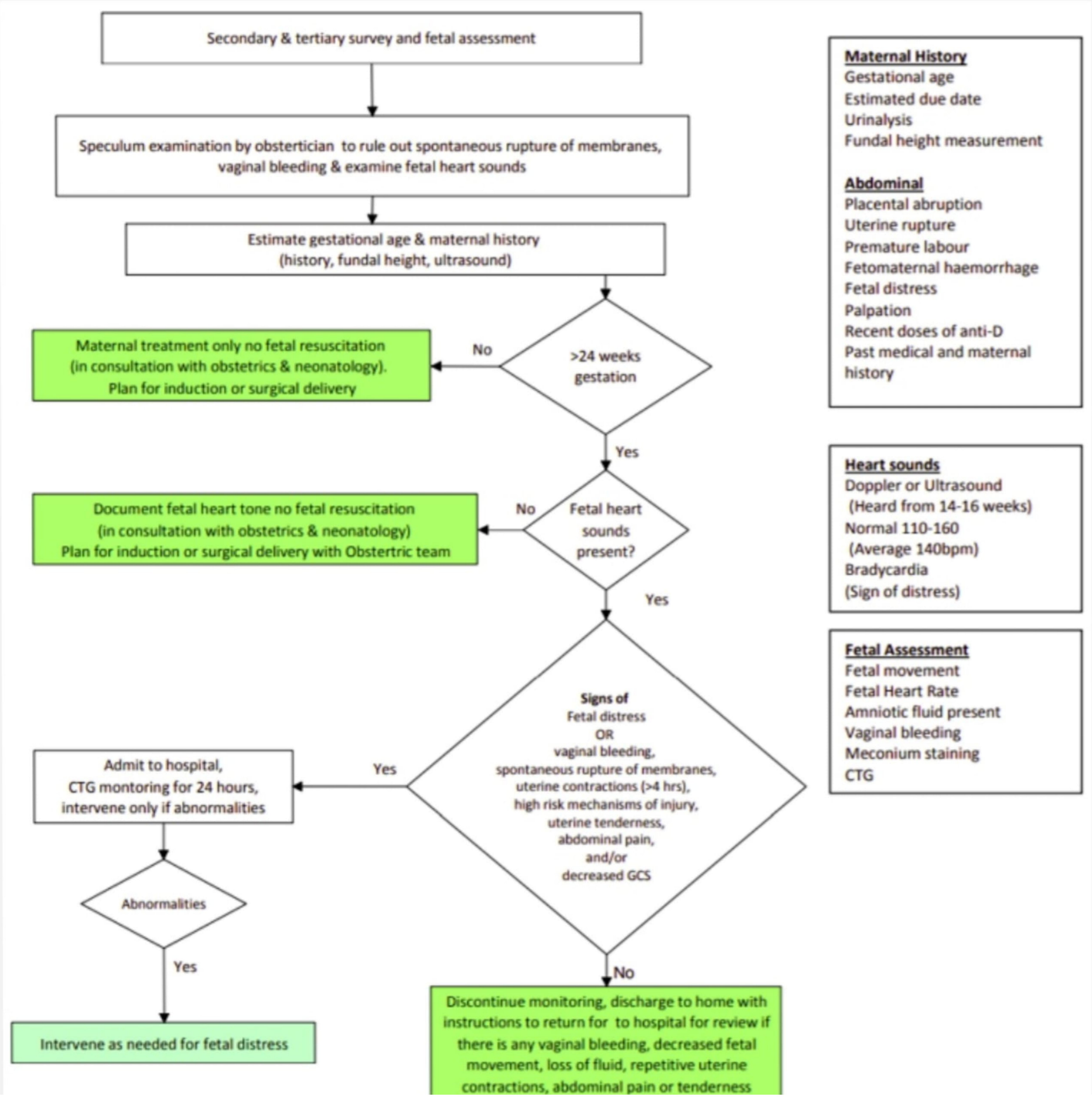
Secondary & tertiary survey and fetal assessment
Speculum examination by obstertician to rule out spontaneous rupture of membranes, vaginal bleeding & examine fetal heart sounds
Estimate gestational age & maternal history (history, fundal height, ultrasound)
>24 weeks gestation
No
Maternal treatment only no fetal resuscitation (in consultation with obstetrics & neonatology). Plan for induction or surgical delivery
Yes
Fetal heart sounds present?
No
Document fetal heart tone no fetal resuscitation (in consultation with obstetrics & neonatology) Plan for induction or surgical delivery with Obstertric team
Yes
Signs of Fetal distress OR vaginal bleeding, spontaneous rupture of membranes, uterine contractions (>4 hrs), high risk mechanisms of injury, uterine tenderness, abdominal pain, and/or decreased GCS
Yes
Admit to hospital, CTG montoring for 24 hours, intervene only if abnormalities
Abnormalities
Yes
Intervene as needed for fetal distress
No
Discontinue monitoring, discharge to home with instructions to return for to hospital for review if there is any vaginal bleeding, decreased fetal movement, loss of fluid, repetitive uterine contractions, abdominal pain or tenderness
Maternal History
Gestational age
Estimated due date
Urinalysis
Fundal height measurement
Abdominal
Placental abruption
Uterine rupture
Premature labour
Fetomaternal haemorrhage
Fetal distress
Palpation
Recent doses of anti-D
Past medical and maternal history
Heart sounds
Doppler or Ultrasound
(Heard from 14-16 weeks)
Normal 110-160
(Average 140bpm)
Bradycardia
(Sign of distress)
Fetal Assessment
Fetal movement
Fetal Heart Rate
Amniotic fluid present
Vaginal bleeding
Meconium staining
CTG

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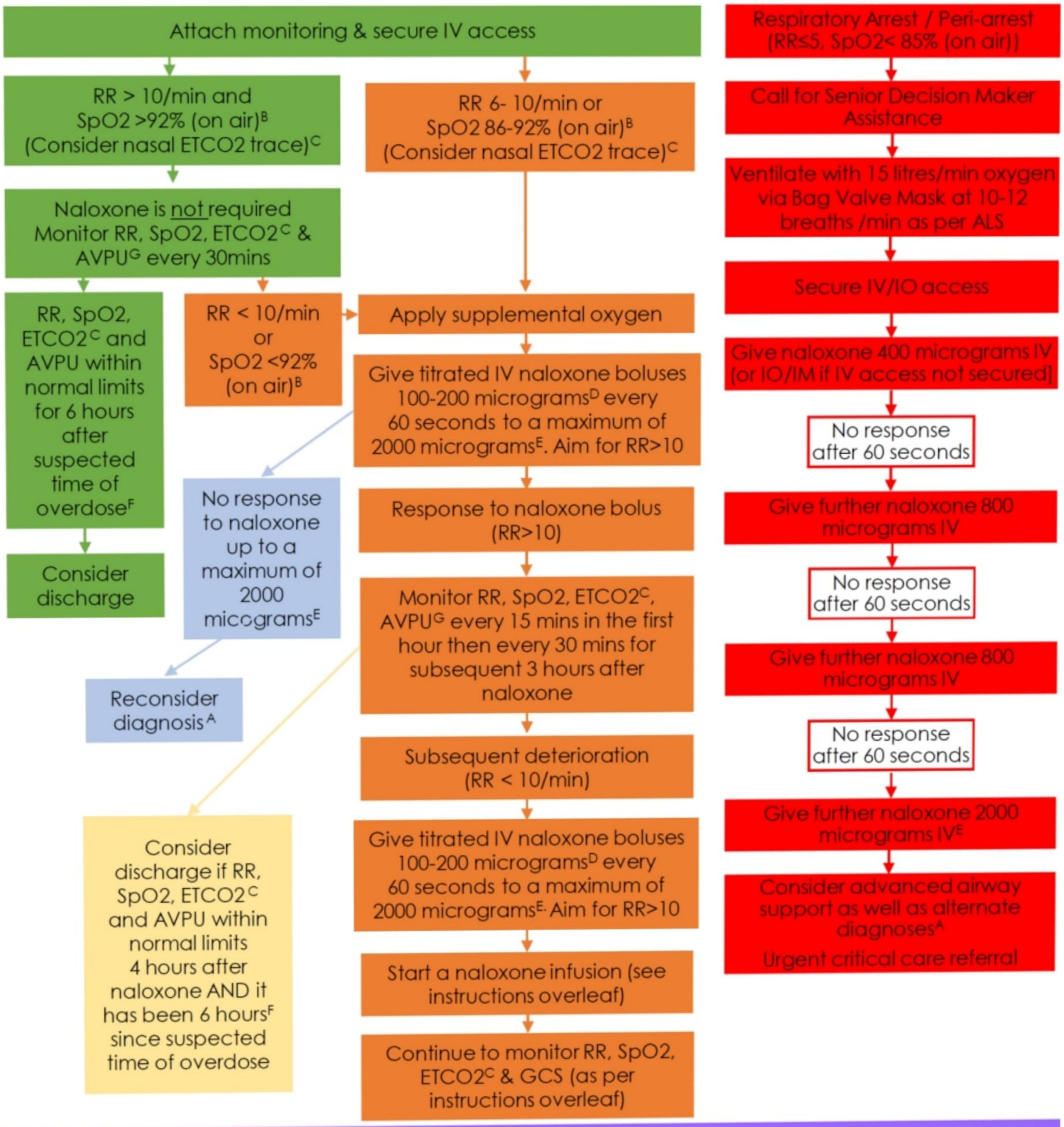
Figure 1: Management of suspected acute opioid toxicity in adults in the ED[A]

(this should NOT be used for opioid toxicity in patients taking prescribed opioids for cancer pain)



Attach monitoring & secure IV access

RR > 10/min and SpO2 >92% (on air)[B] (Consider nasal ETCO2 trace)[C]

Naloxone is not required. Monitor RR, SpO2, ETCO2[C] & AVPU[G] every 30mins

RR, SpO2, ETCO2[C] and AVPU within normal limits for 6 hours after suspected time of overdose[F]

Consider discharge

RR < 10/min or SpO2 <92% (on air)[B]

RR 6- 10/min or SpO2 86-92% (on air)[B] (Consider nasal ETCO2 trace)[C]

Apply supplemental oxygen

Give titrated IV naloxone boluses 100-200 micrograms[D] every 60 seconds to a maximum of 2000 micrograms[E]. Aim for RR>10

No response to naloxone up to a maximum of 2000 micograms[E]

Reconsider diagnosis[A]

Response to naloxone bolus (RR>10)

Monitor RR, SpO2, ETCO2[C], AVPU[G] every 15 mins in the first hour then every 30 mins for subsequent 3 hours after naloxone

Consider discharge if RR, SpO2, ETCO2[C] and AVPU within normal limits 4 hours after naloxone AND it has been 6 hours[F] since suspected time of overdose

Subsequent deterioration (RR < 10/min)

Give titrated IV naloxone boluses 100-200 micrograms[D] every 60 seconds to a maximum of 2000 micrograms[E]. Aim for RR>10

Start a naloxone infusion (see instructions overleaf)

Continue to monitor RR, SpO2, ETCO2[C] & GCS (as per instructions overleaf)

Respiratory Arrest / Peri-arrest (RR≤5, SpO2< 85% (on air))

Call for Senior Decision Maker Assistance

Ventilate with 15 litres/min oxygen via Bag Valve Mask at 10-12 breaths /min as per ALS

Secure IV/IO access

Give naloxone 400 micrograms IV (or IO/IM if IV access not secured)

No response after 60 seconds

Give further naloxone 800 micrograms IV

No response after 60 seconds

Give further naloxone 800 micrograms IV

No response after 60 seconds

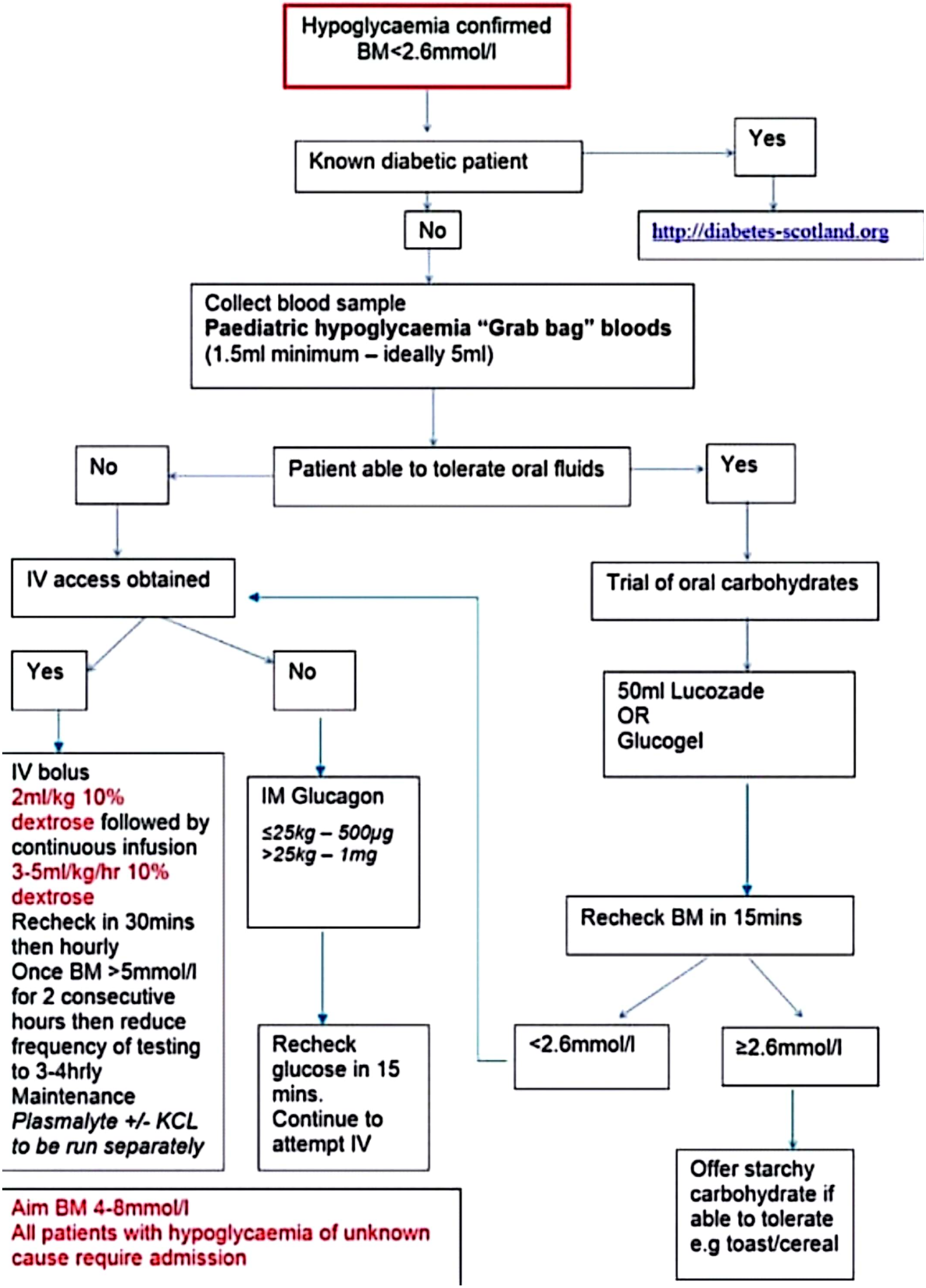
Give further naloxone 2000 micrograms IV[E]

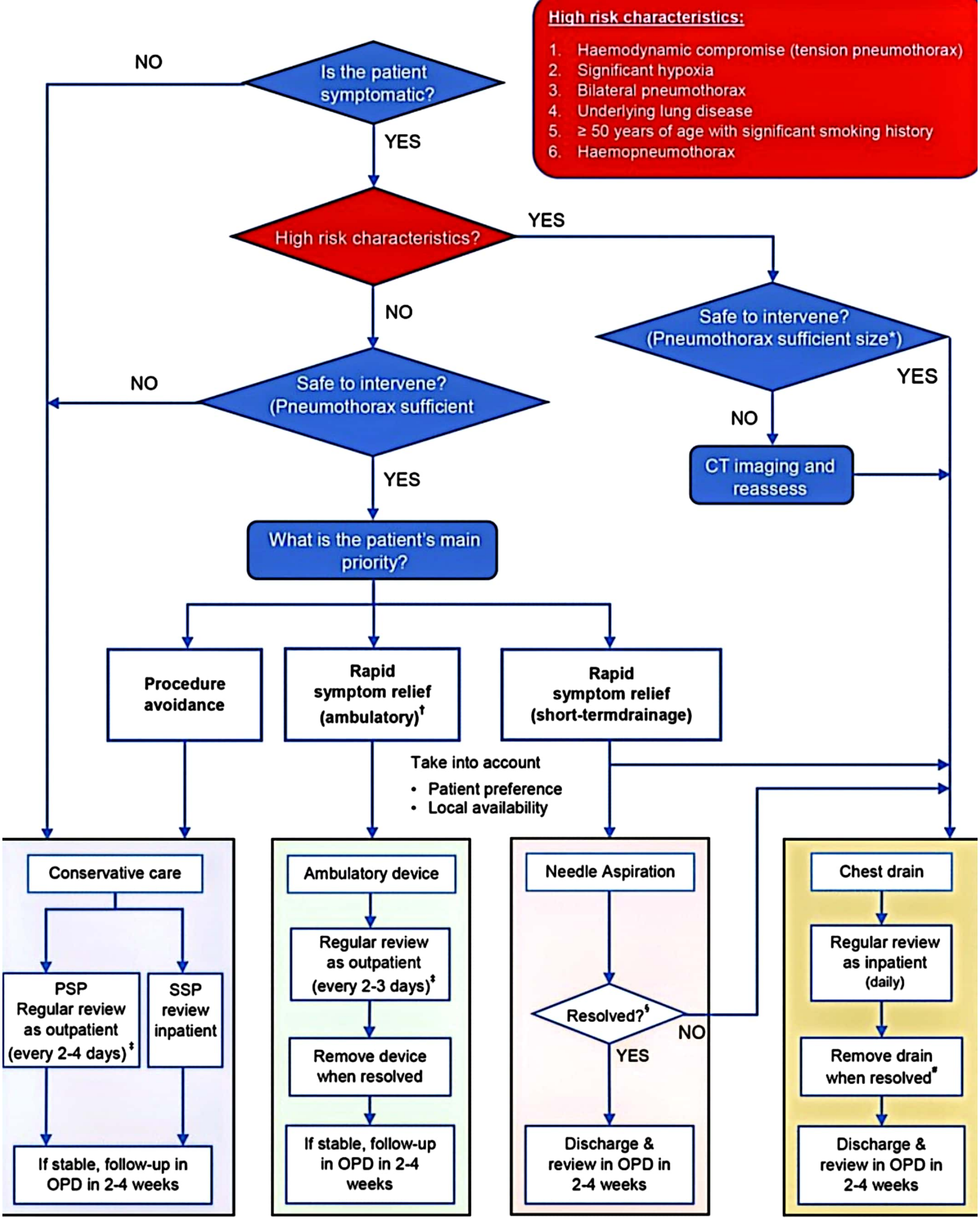
Consider advanced airway support as well as alternate diagnoses[A]

Urgent critical care referral

A. Always consider alternate diagnoses, investigations should include BM, VBG, paracetamol concentration ± CT Head
B. Interpret saturations with caution in those with pre-existing respiratory disease such as COPD
C. If available (and clinicians are experienced in its use), nasal ETCO2 can be used as an adjunct to the clinical assessment of ventilatory status to aid decision making, but it should be interpreted with caution in those with pre-existing respiratory disease and in context of the history and clinical signs
D. Initial naloxone bolus doses should be 100 micrograms, if the patient does not respond to four 100 microgram boluses, subsequent bolus doses should be 200 micrograms. Draw up 1x 400 microgram naloxone vial in a 10mL syringe and make up to 10mL with saline. A 100 microgram bolus will be 2.5mL and a 200 microgram bolus will be 5mL.
E. Those with severe toxicity or exposed to highly potent opioids may require larger doses of naloxone (more than 4 mg)
F. If a patient reports, or the clinician suspects, use of a longer acting opioid such as methadone or an NPS opioid the observation period should be extended up to 12 hours.
G. Whilst it is useful to monitor level of consciousness (AVPU, GCS), the aim of naloxone administration should be reversal of respiratory depression and maintenance of airway protective reflexes, not full reversal of unconsciousness.

This is a suggested pathway for management and not a mandatory standard of care. Clinicians (particularly senior decision-makers with sufficient anaesthetic training) may choose use alternative approaches, including oxygenation with permissive hypercapnia, or lower bolus doses of naloxone, and tolerate lower respiratory rates than suggested here.


Hypoglycaemia confirmed
BM<2.6mmol/l
Known diabetic patient
Yes
http://diabetes-scotland.org
No
Collect blood sample
Paediatric hypoglycaemia "Grab bag" bloods
(1.5ml minimum – ideally 5ml)
No
Patient able to tolerate oral fluids
Yes
IV access obtained
Trial of oral carbohydrates
Yes
No
50ml Lucozade
OR
Glucogel
IV bolus
2ml/kg 10% dextrose followed by continuous infusion 3-5ml/kg/hr 10% dextrose
Recheck in 30mins then hourly
Once BM >5mmol/l for 2 consecutive hours then reduce frequency of testing to 3-4hrly
Maintenance
Plasmalyte +/- KCL to be run separately
IM Glucagon
≤25kg – 500μg
>25kg – 1mg
Recheck BM in 15mins
Recheck glucose in 15 mins.
Continue to attempt IV
<2.6mmol/l
≥2.6mmol/l
Offer starchy carbohydrate if able to tolerate e.g toast/cereal
Aim BM 4-8mmol/l
All patients with hypoglycaemia of unknown cause require admission


High risk characteristics:
1. Haemodynamic compromise (tension pneumothorax)
2. Significant hypoxia
3. Bilateral pneumothorax
4. Underlying lung disease
5. ≥ 50 years of age with significant smoking history
6. Haemopneumothorax
Is the patient symptomatic?
NO
YES
High risk characteristics?
YES
NO
Safe to intervene? (Pneumothorax sufficient size*)
YES
NO
CT imaging and reassess
Safe to intervene? (Pneumothorax sufficient
NO
YES
What is the patient's main priority?
Procedure avoidance
Rapid symptom relief (ambulatory)†
Rapid symptom relief (short-termdrainage)
Take into account
• Patient preference
• Local availability
Conservative care
PSP Regular review as outpatient (every 2-4 days)‡
SSP review inpatient
If stable, follow-up in OPD in 2-4 weeks
Ambulatory device
Regular review as outpatient (every 2-3 days)‡
Remove device when resolved
If stable, follow-up in OPD in 2-4 weeks
Needle Aspiration
Resolved?§
NO
YES
Discharge & review in OPD in 2-4 weeks
Chest drain
Regular review as inpatient (daily)
Remove drain when resolved#
Discharge & review in OPD in 2-4 weeks

---

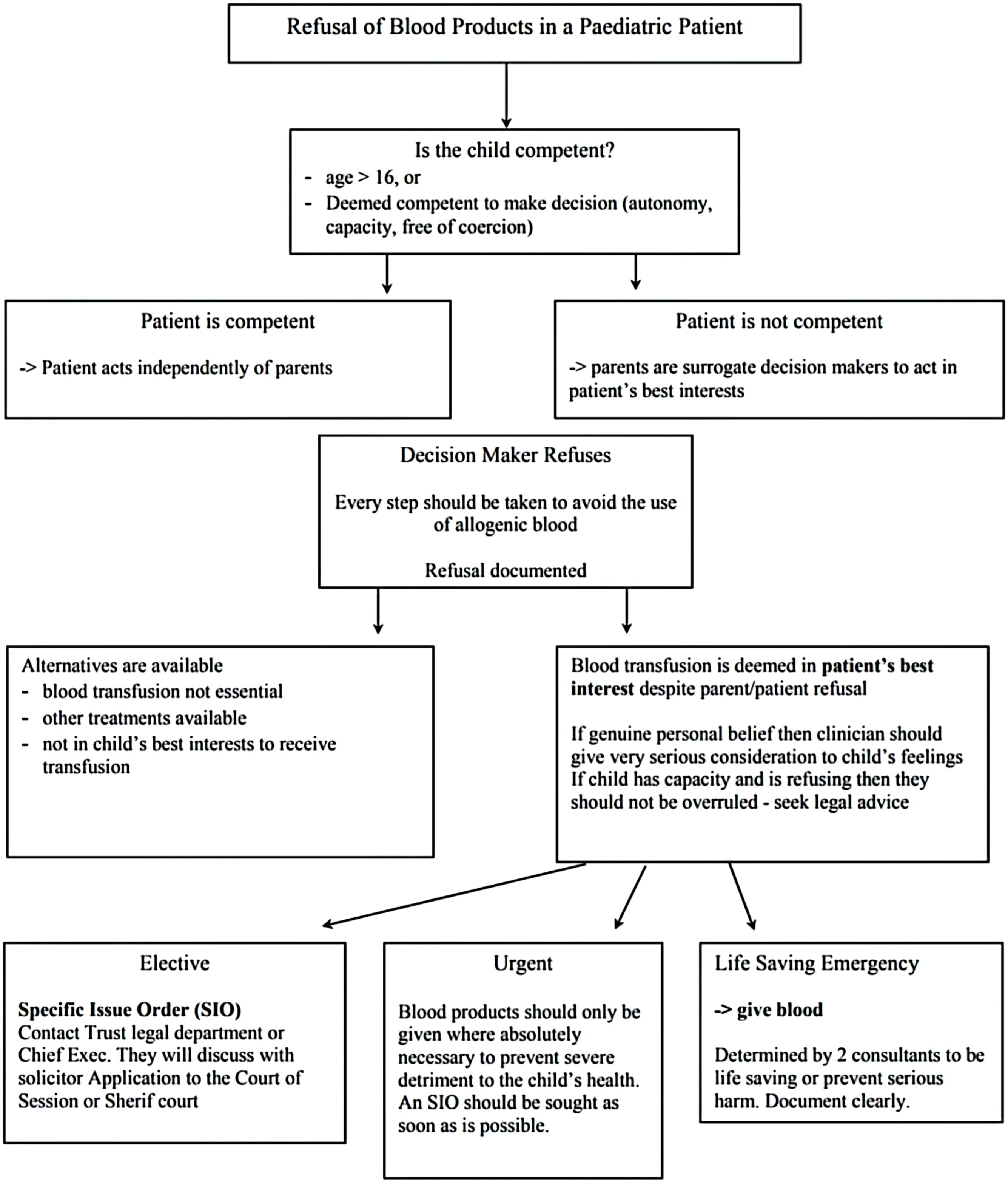
[*] Pneumothorax of sufficient size to intervene depends on clinical context but, in general, usually ≥ 2cm laterally or apically on CXR, or any size on CT scan which can be safely accessed with radiological support.

[†] If ambulatory pathway available locally.

[‡] At review, if enlarging pneumothorax or symptoms consider chest drain insertion and admission.

[§] Success: improvement in symptoms and sustained improvement on CXR.

[#] Talc pleurodesis can be considered on the first episode of pneumothorax in high risk patients in whom repeat pneumothorax would be hazardous (eg, severe COPD).



Refusal of Blood Products in a Paediatric Patient

Is the child competent?

- age > 16, or
- Deemed competent to make decision (autonomy, capacity, free of coercion)

Patient is competent

-> Patient acts independently of parents

Patient is not competent

-> parents are surrogate decision makers to act in patient's best interests

Decision Maker Refuses

Every step should be taken to avoid the use of allogenic blood

Refusal documented

Alternatives are available

- blood transfusion not essential
- other treatments available
- not in child's best interests to receive transfusion

Blood transfusion is deemed in **patient's best interest** despite parent/patient refusal

If genuine personal belief then clinician should give very serious consideration to child's feelings If child has capacity and is refusing then they should not be overruled - seek legal advice

Elective

Specific Issue Order (SIO)
Contact Trust legal department or Chief Exec. They will discuss with solicitor Application to the Court of Session or Sherif court

Urgent

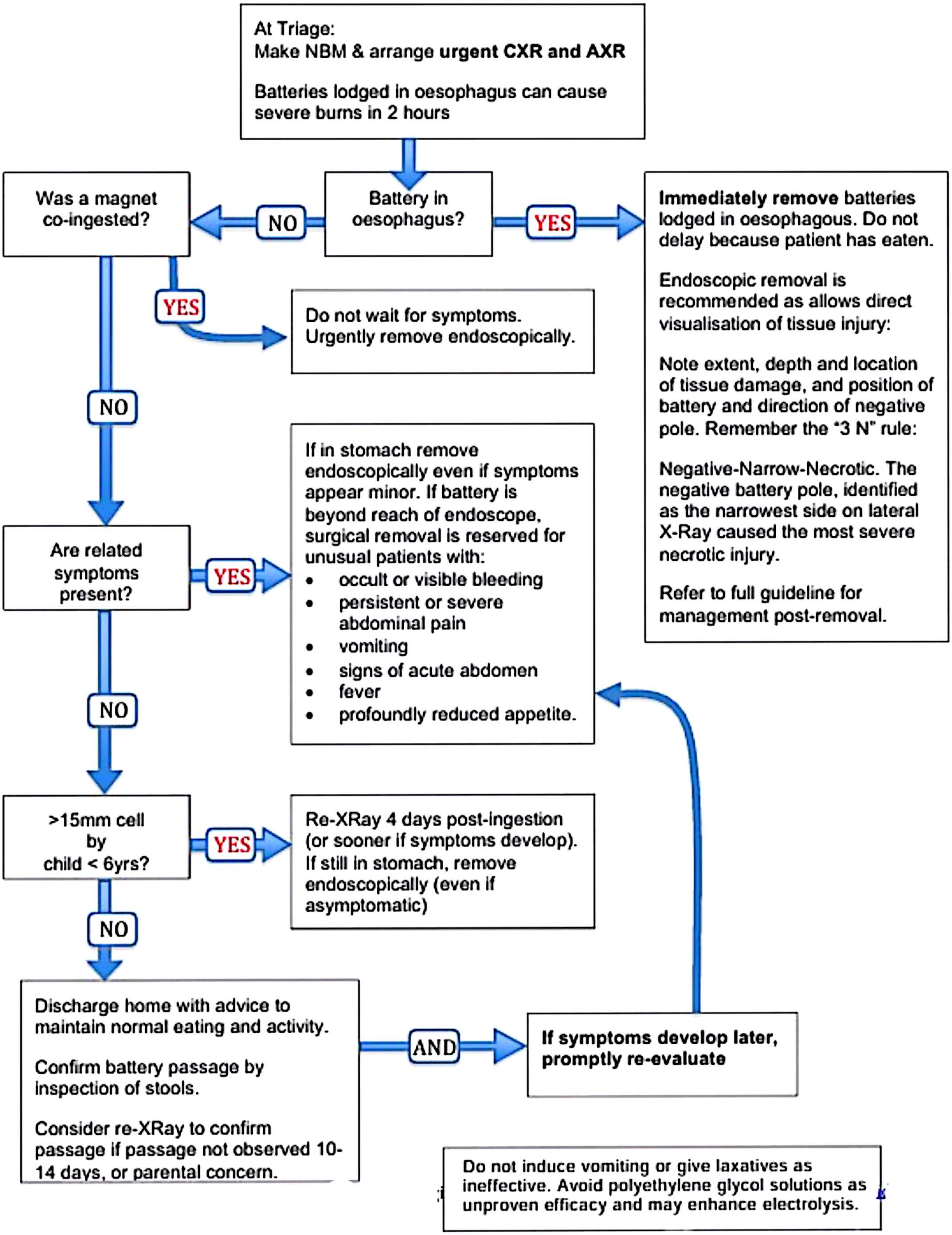
Blood products should only be given where absolutely necessary to prevent severe detriment to the child's health. An SIO should be sought as soon as is possible.

Life Saving Emergency

-> give blood

Determined by 2 consultants to be life saving or prevent serious harm. Document clearly.

Guideline for known or suspected button battery ingestion



At Triage:
Make NBM & arrange **urgent CXR and AXR**

Batteries lodged in oesophagus can cause severe burns in 2 hours

Battery in oesophagus?

YES

Immediately remove batteries lodged in oesophagous. Do not delay because patient has eaten.

Endoscopic removal is recommended as allows direct visualisation of tissue injury:

Note extent, depth and location of tissue damage, and position of battery and direction of negative pole. Remember the "3 N" rule:

Negative-Narrow-Necrotic. The negative battery pole, identified as the narrowest side on lateral X-Ray caused the most severe necrotic injury.

Refer to full guideline for management post-removal.

NO

Was a magnet co-ingested?

YES

Do not wait for symptoms.
Urgently remove endoscopically.

NO

Are related symptoms present?

YES

If in stomach remove endoscopically even if symptoms appear minor. If battery is beyond reach of endoscope, surgical removal is reserved for unusual patients with:

- occult or visible bleeding
- persistent or severe abdominal pain
- vomiting
- signs of acute abdomen
- fever
- profoundly reduced appetite.

NO

>15mm cell by child < 6yrs?

YES

Re-XRay 4 days post-ingestion (or sooner if symptoms develop). If still in stomach, remove endoscopically (even if asymptomatic)

NO

Discharge home with advice to maintain normal eating and activity.

Confirm battery passage by inspection of stools.

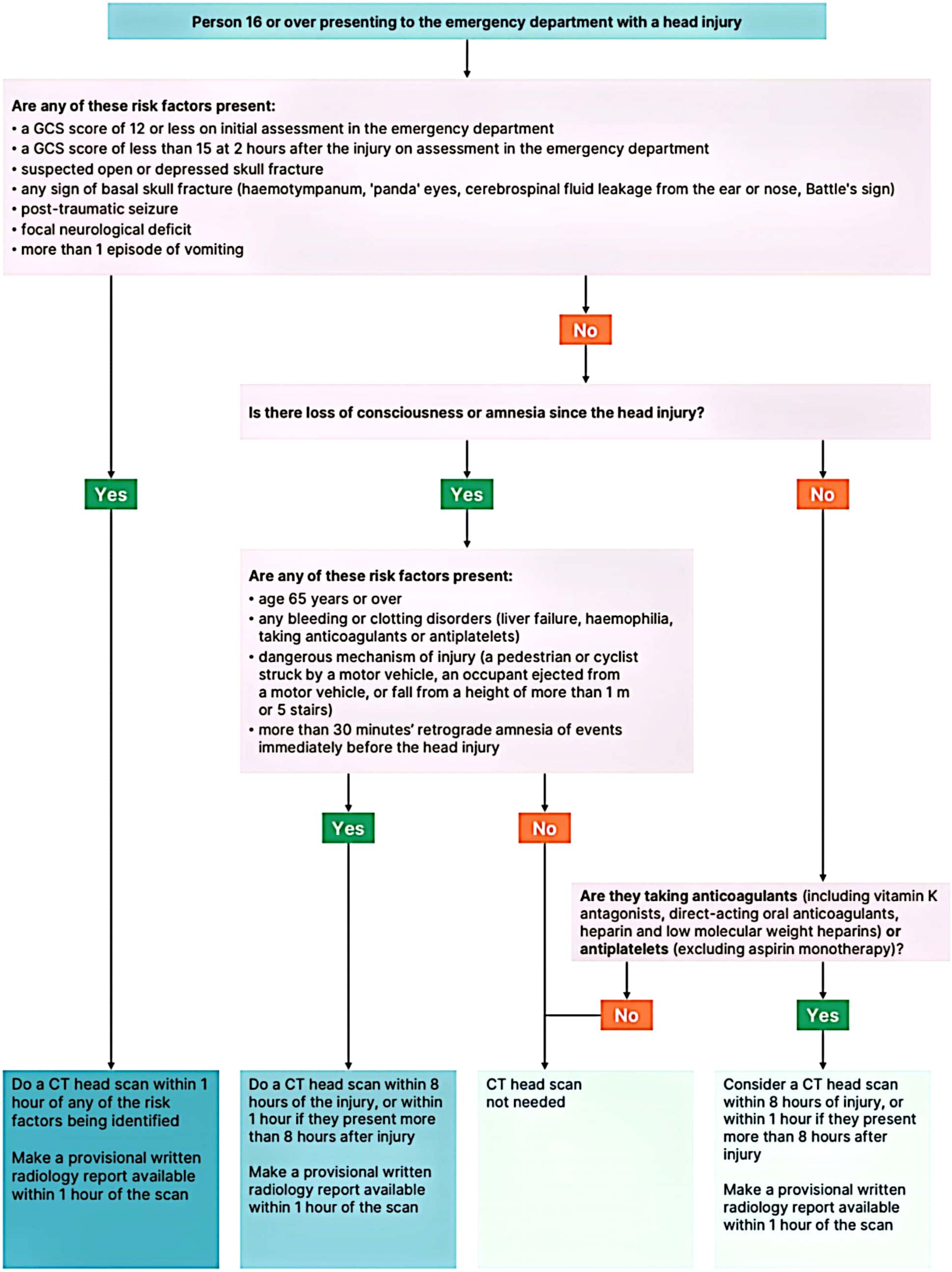
Consider re-XRay to confirm passage if passage not observed 10-14 days, or parental concern.

AND

If symptoms develop later, promptly re-evaluate

Do not induce vomiting or give laxatives as ineffective. Avoid polyethylene glycol solutions as unproven efficacy and may enhance electrolysis.

Algorithm 1: selecting people 16 and over for a CT head scan



Person 16 or over presenting to the emergency department with a head injury

Are any of these risk factors present:

- a GCS score of 12 or less on initial assessment in the emergency department
- a GCS score of less than 15 at 2 hours after the injury on assessment in the emergency department
- suspected open or depressed skull fracture
- any sign of basal skull fracture (haemotympanum, 'panda' eyes, cerebrospinal fluid leakage from the ear or nose, Battle's sign)
- post-traumatic seizure
- focal neurological deficit
- more than 1 episode of vomiting

No

Is there loss of consciousness or amnesia since the head injury?

Yes

Yes

No

Are any of these risk factors present:

- age 65 years or over
- any bleeding or clotting disorders (liver failure, haemophilia, taking anticoagulants or antiplatelets)
- dangerous mechanism of injury (a pedestrian or cyclist struck by a motor vehicle, an occupant ejected from a motor vehicle, or fall from a height of more than 1 m or 5 stairs)
- more than 30 minutes' retrograde amnesia of events immediately before the head injury

Yes

No

Are they taking anticoagulants (including vitamin K antagonists, direct-acting oral anticoagulants, heparin and low molecular weight heparins) **or antiplatelets** (excluding aspirin monotherapy)?

No

Yes

Do a CT head scan within 1 hour of any of the risk factors being identified

Make a provisional written radiology report available within 1 hour of the scan

Do a CT head scan within 8 hours of the injury, or within 1 hour if they present more than 8 hours after injury

Make a provisional written radiology report available within 1 hour of the scan

CT head scan not needed

Consider a CT head scan within 8 hours of injury, or within 1 hour if they present more than 8 hours after injury

Make a provisional written radiology report available within 1 hour of the scan

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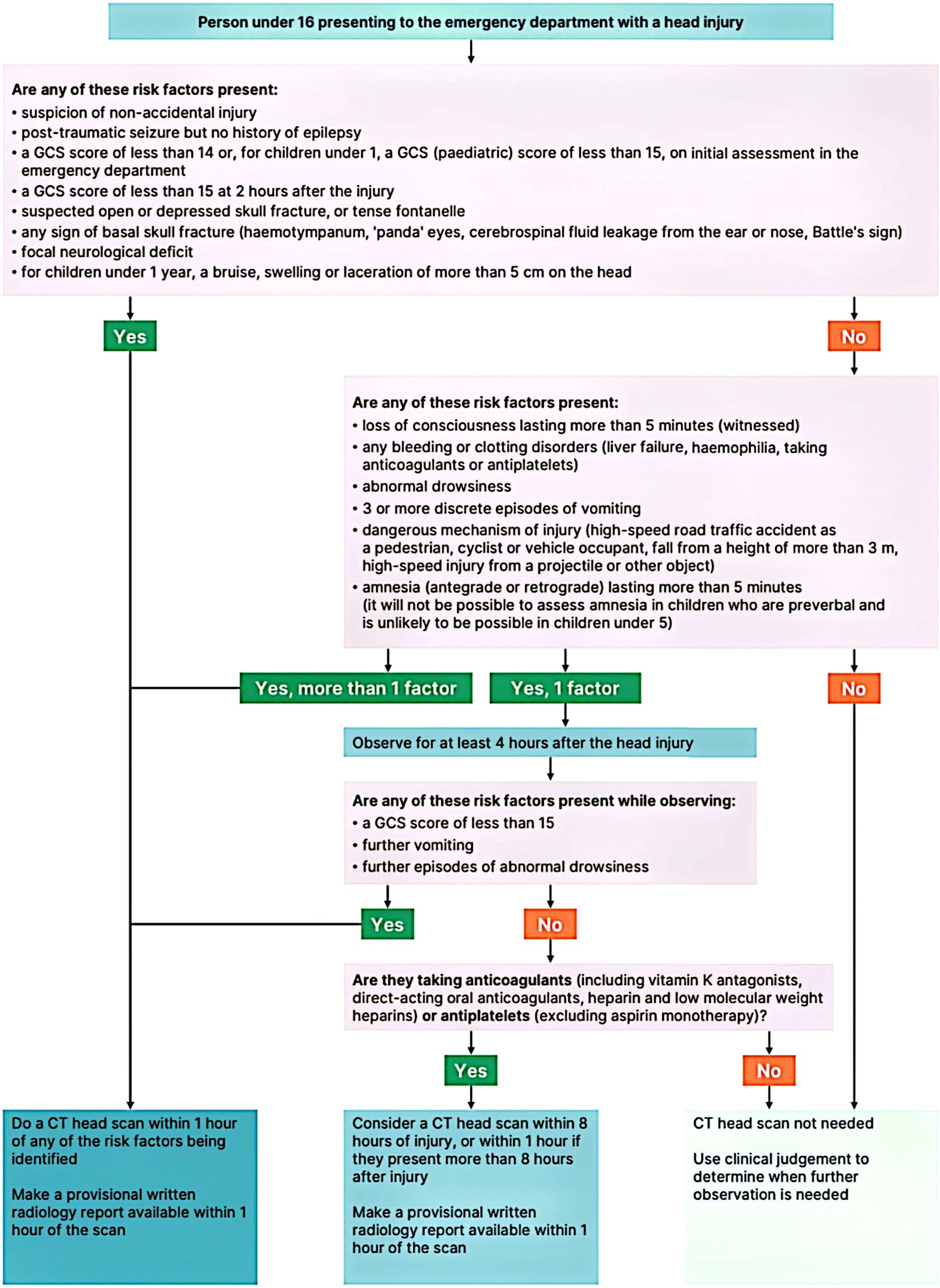
Algorithm 2: selecting people under 16 for a CT head scan



Person under 16 presenting to the emergency department with a head injury

Are any of these risk factors present:

- suspicion of non-accidental injury
- post-traumatic seizure but no history of epilepsy
- a GCS score of less than 14 or, for children under 1, a GCS (paediatric) score of less than 15, on initial assessment in the emergency department
- a GCS score of less than 15 at 2 hours after the injury
- suspected open or depressed skull fracture, or tense fontanelle
- any sign of basal skull fracture (haemotympanum, 'panda' eyes, cerebrospinal fluid leakage from the ear or nose, Battle's sign)
- focal neurological deficit
- for children under 1 year, a bruise, swelling or laceration of more than 5 cm on the head

Yes

No

Are any of these risk factors present:

- loss of consciousness lasting more than 5 minutes (witnessed)
- any bleeding or clotting disorders (liver failure, haemophilia, taking anticoagulants or antiplatelets)
- abnormal drowsiness
- 3 or more discrete episodes of vomiting
- dangerous mechanism of injury (high-speed road traffic accident as a pedestrian, cyclist or vehicle occupant, fall from a height of more than 3 m, high-speed injury from a projectile or other object)
- amnesia (antegrade or retrograde) lasting more than 5 minutes (it will not be possible to assess amnesia in children who are preverbal and is unlikely to be possible in children under 5)

Yes, more than 1 factor

Yes, 1 factor

No

Observe for at least 4 hours after the head injury

Are any of these risk factors present while observing:

- a GCS score of less than 15
- further vomiting
- further episodes of abnormal drowsiness

Yes

No

Are they taking anticoagulants (including vitamin K antagonists, direct-acting oral anticoagulants, heparin and low molecular weight heparins) **or antiplatelets** (excluding aspirin monotherapy)?

Yes

No

Do a CT head scan within 1 hour of any of the risk factors being identified

Make a provisional written radiology report available within 1 hour of the scan

Consider a CT head scan within 8 hours of injury, or within 1 hour if they present more than 8 hours after injury

Make a provisional written radiology report available within 1 hour of the scan

CT head scan not needed

Use clinical judgement to determine when further observation is needed

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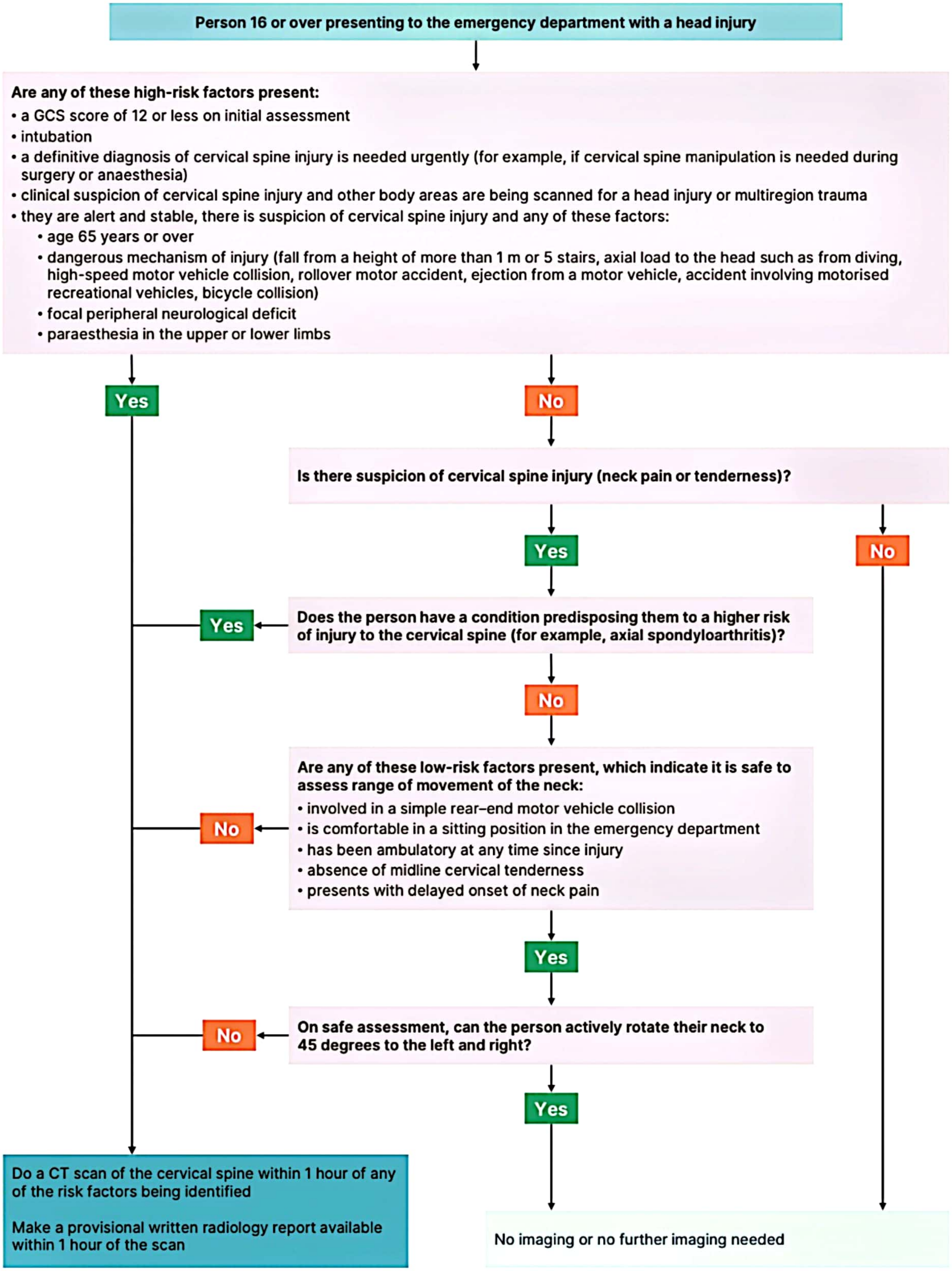
Algorithm 3: selecting people 16 and over for imaging of the cervical spine



Person 16 or over presenting to the emergency department with a head injury

Are any of these high-risk factors present:
- a GCS score of 12 or less on initial assessment
- intubation
- a definitive diagnosis of cervical spine injury is needed urgently (for example, if cervical spine manipulation is needed during surgery or anaesthesia)
- clinical suspicion of cervical spine injury and other body areas are being scanned for a head injury or multiregion trauma
- they are alert and stable, there is suspicion of cervical spine injury and any of these factors:
  - age 65 years or over
  - dangerous mechanism of injury (fall from a height of more than 1 m or 5 stairs, axial load to the head such as from diving, high-speed motor vehicle collision, rollover motor accident, ejection from a motor vehicle, accident involving motorised recreational vehicles, bicycle collision)
  - focal peripheral neurological deficit
  - paraesthesia in the upper or lower limbs

Yes

No

Is there suspicion of cervical spine injury (neck pain or tenderness)?

Yes

No

Yes

Does the person have a condition predisposing them to a higher risk of injury to the cervical spine (for example, axial spondyloarthritis)?

No

No

Are any of these low-risk factors present, which indicate it is safe to assess range of movement of the neck:
- involved in a simple rear–end motor vehicle collision
- is comfortable in a sitting position in the emergency department
- has been ambulatory at any time since injury
- absence of midline cervical tenderness
- presents with delayed onset of neck pain

Yes

No

On safe assessment, can the person actively rotate their neck to 45 degrees to the left and right?

Yes

Do a CT scan of the cervical spine within 1 hour of any of the risk factors being identified

Make a provisional written radiology report available within 1 hour of the scan

No imaging or no further imaging needed

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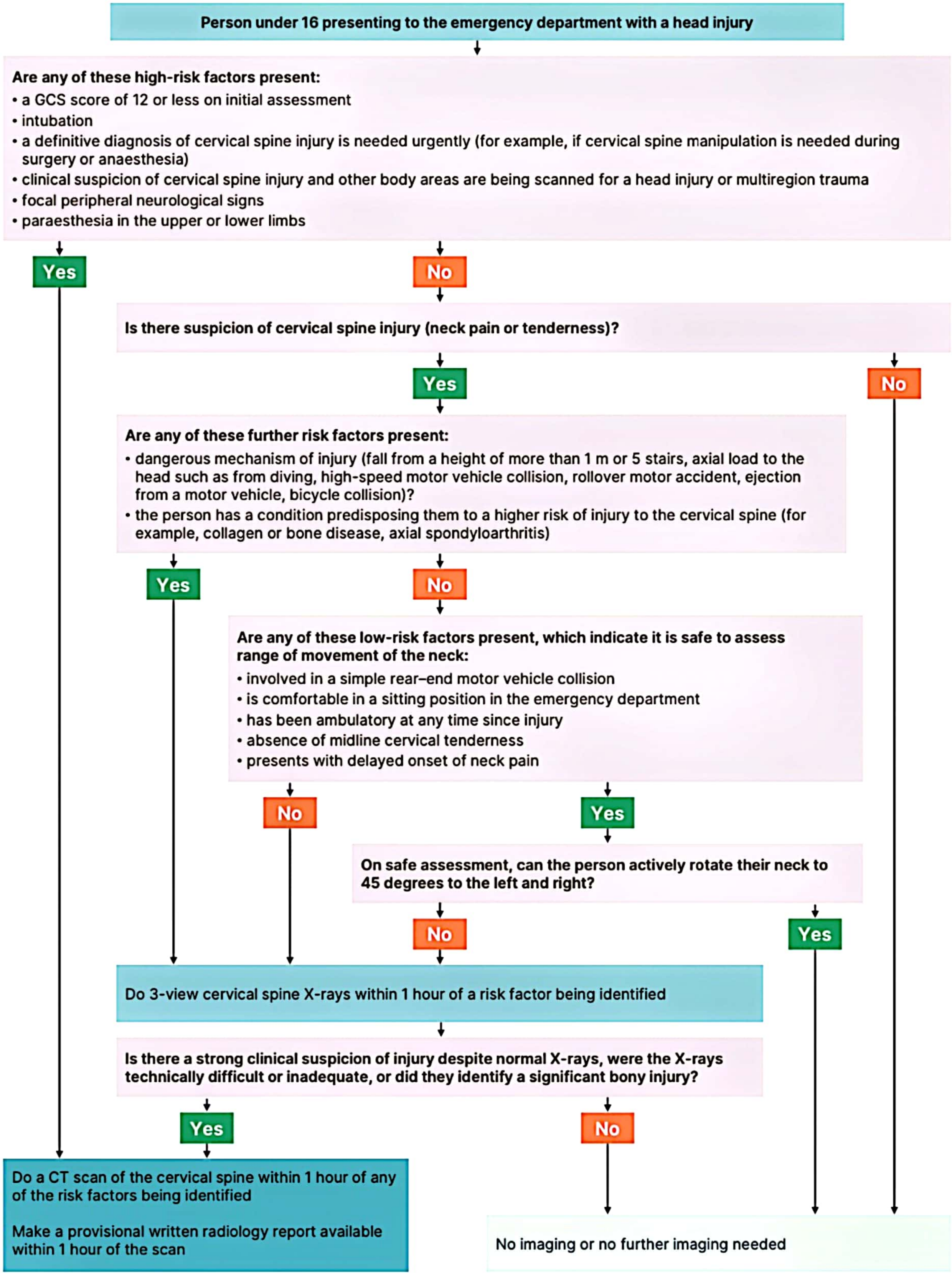
Algorithm 4: selecting people under 16 for imaging of the cervical spine



Person under 16 presenting to the emergency department with a head injury

Are any of these high-risk factors present:
- a GCS score of 12 or less on initial assessment
- intubation
- a definitive diagnosis of cervical spine injury is needed urgently (for example, if cervical spine manipulation is needed during surgery or anaesthesia)
- clinical suspicion of cervical spine injury and other body areas are being scanned for a head injury or multiregion trauma
- focal peripheral neurological signs
- paraesthesia in the upper or lower limbs

Is there suspicion of cervical spine injury (neck pain or tenderness)?

Are any of these further risk factors present:
- dangerous mechanism of injury (fall from a height of more than 1 m or 5 stairs, axial load to the head such as from diving, high-speed motor vehicle collision, rollover motor accident, ejection from a motor vehicle, bicycle collision)?
- the person has a condition predisposing them to a higher risk of injury to the cervical spine (for example, collagen or bone disease, axial spondyloarthritis)

Are any of these low-risk factors present, which indicate it is safe to assess range of movement of the neck:
- involved in a simple rear–end motor vehicle collision
- is comfortable in a sitting position in the emergency department
- has been ambulatory at any time since injury
- absence of midline cervical tenderness
- presents with delayed onset of neck pain

On safe assessment, can the person actively rotate their neck to 45 degrees to the left and right?

Do 3-view cervical spine X-rays within 1 hour of a risk factor being identified

Is there a strong clinical suspicion of injury despite normal X-rays, were the X-rays technically difficult or inadequate, or did they identify a significant bony injury?

Do a CT scan of the cervical spine within 1 hour of any of the risk factors being identified

Make a provisional written radiology report available within 1 hour of the scan

No imaging or no further imaging needed

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Anaphylaxis

Anaphylaxis?

A = Airway **B** = Breathing **C** = Circulation **D** = Disability **E** = Exposure

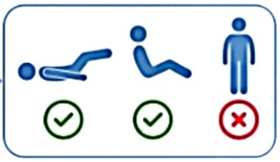
Diagnosis – look for:

- Sudden onset of Airway and/or Breathing and/or Circulation problems[1]
- And usually skin changes (e.g. itchy rash)

Call for HELP

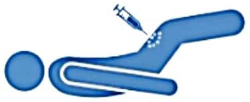
Call resuscitation team or ambulance

- Remove trigger if possible (e.g. stop any infusion)
- Lie patient flat (with or without legs elevated)
  - A sitting position may make breathing easier
  - If pregnant, lie on left side



Give intramuscular (IM) adrenaline[2]

Inject at **anterolateral aspect** – middle third of the thigh



- Establish airway
- Give high flow oxygen
- Apply monitoring: pulse oximetry, ECG, blood pressure

If no response:

- Repeat IM adrenaline after 5 minutes
- IV fluid bolus[3]

If no improvement in Breathing or Circulation problems[1] despite TWO doses of IM adrenaline:

- Confirm resuscitation team or ambulance has been called
- Follow REFRACTORY ANAPHYLAXIS ALGORITHM

1. Life-threatening problems

Airway
Hoarse voice, stridor

Breathing
↑work of breathing, wheeze, fatigue, cyanosis, SpO_2 <94%

Circulation
Low blood pressure, signs of shock, confusion, reduced consciousness

2. Intramuscular (IM) adrenaline
Use adrenaline at 1 mg/mL (1:1000) concentration

Adult and child >12 years:	500 micrograms IM (0.5 mL)
Child 6–12 years:	300 micrograms IM (0.3 mL)
Child 6 months to 6 years:	150 micrograms IM (0.15 mL)
Child <6 months:	100–150 micrograms IM (0.1–0.15 mL)

The above doses are for IM injection **only**.
Intravenous adrenaline for anaphylaxis to be given **only by experienced specialists** in an appropriate setting.

3. IV fluid challenge
Use crystalloid

Adults:	500–1000 mL
Children:	10 mL/kg

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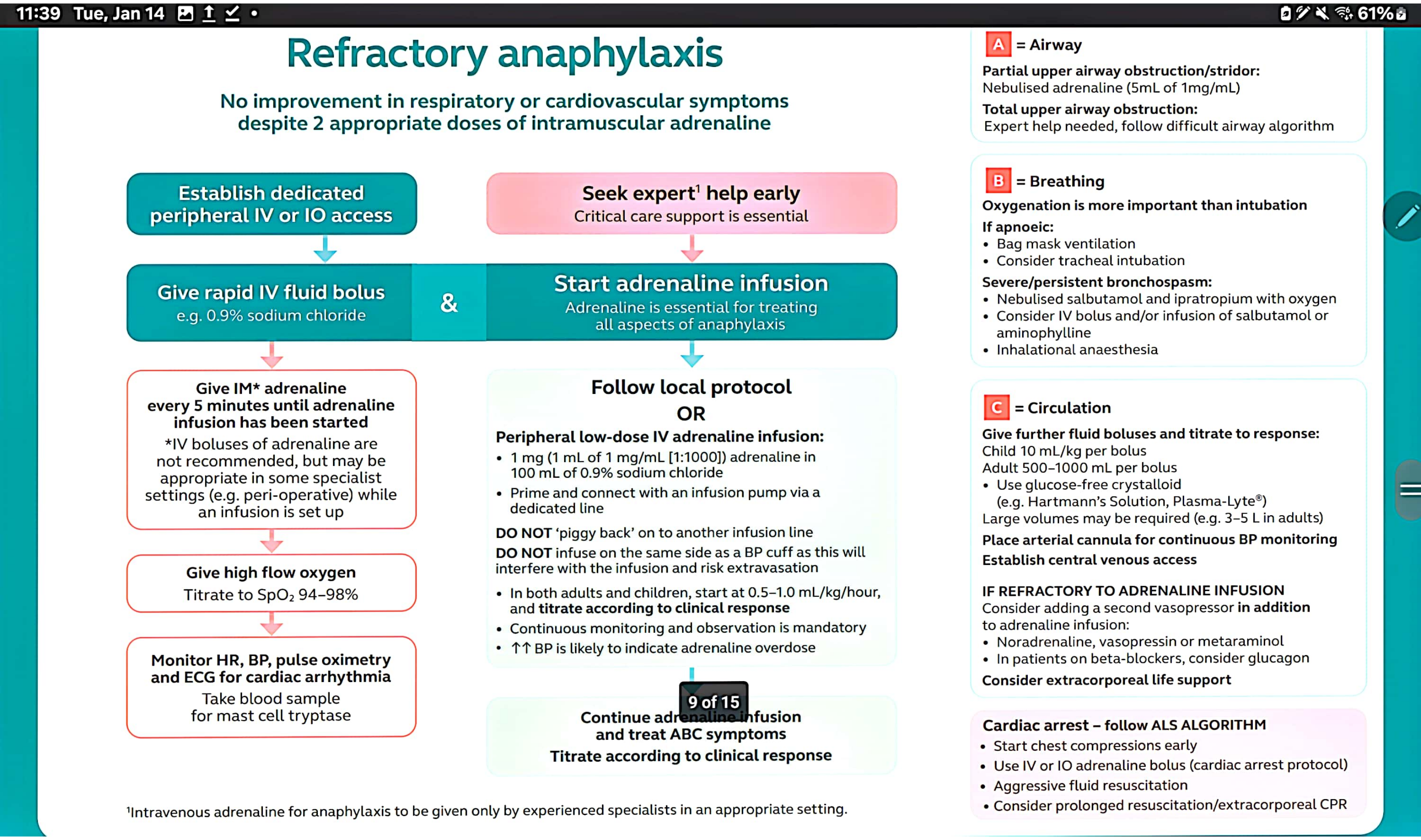

Refractory anaphylaxis

No improvement in respiratory or cardiovascular symptoms despite 2 appropriate doses of intramuscular adrenaline

Establish dedicated peripheral IV or IO access

Seek expert[1] help early
Critical care support is essential

Give rapid IV fluid bolus
e.g. 0.9% sodium chloride

&

Start adrenaline infusion
Adrenaline is essential for treating all aspects of anaphylaxis

Give IM* adrenaline every 5 minutes until adrenaline infusion has been started
*IV boluses of adrenaline are not recommended, but may be appropriate in some specialist settings (e.g. peri-operative) while an infusion is set up

Give high flow oxygen
Titrate to SpO_2 94–98%

Monitor HR, BP, pulse oximetry and ECG for cardiac arrhythmia
Take blood sample for mast cell tryptase

Follow local protocol
OR

Peripheral low-dose IV adrenaline infusion:
- 1 mg (1 mL of 1 mg/mL [1:1000]) adrenaline in 100 mL of 0.9% sodium chloride
- Prime and connect with an infusion pump via a dedicated line

DO NOT 'piggy back' on to another infusion line

DO NOT infuse on the same side as a BP cuff as this will interfere with the infusion and risk extravasation

- In both adults and children, start at 0.5–1.0 mL/kg/hour, and **titrate according to clinical response**
- Continuous monitoring and observation is mandatory
- ↑↑ BP is likely to indicate adrenaline overdose

Continue adrenaline infusion and treat ABC symptoms
Titrate according to clinical response

A = Airway

Partial upper airway obstruction/stridor:
Nebulised adrenaline (5mL of 1mg/mL)

Total upper airway obstruction:
Expert help needed, follow difficult airway algorithm

B = Breathing

Oxygenation is more important than intubation

If apnoeic:
- Bag mask ventilation
- Consider tracheal intubation

Severe/persistent bronchospasm:
- Nebulised salbutamol and ipratropium with oxygen
- Consider IV bolus and/or infusion of salbutamol or aminophylline
- Inhalational anaesthesia

C = Circulation

Give further fluid boluses and titrate to response:
Child 10 mL/kg per bolus
Adult 500–1000 mL per bolus
- Use glucose-free crystalloid (e.g. Hartmann's Solution, Plasma-Lyte®)

Large volumes may be required (e.g. 3–5 L in adults)

Place arterial cannula for continuous BP monitoring

Establish central venous access

IF REFRACTORY TO ADRENALINE INFUSION
Consider adding a second vasopressor **in addition** to adrenaline infusion:
- Noradrenaline, vasopressin or metaraminol
- In patients on beta-blockers, consider glucagon

Consider extracorporeal life support

Cardiac arrest – follow ALS ALGORITHM
- Start chest compressions early
- Use IV or IO adrenaline bolus (cardiac arrest protocol)
- Aggressive fluid resuscitation
- Consider prolonged resuscitation/extracorporeal CPR

[1] Intravenous adrenaline for anaphylaxis to be given only by experienced specialists in an appropriate setting.

Acute asthma in children

Acute asthma in children aged 2–12 years

These clinical features increase the probability of a diagnosis of asthma:

- More than one of the following: wheeze, cough, difficulty breathing and chest tightness. The risk is increased if these symptoms are recurrent, worse at night or in the early morning, occur during or after exercise or trigger dependent (e.g. with exposure to pets, cold, humidity, heightened emotions or occurring independent of upper respiratory tract infections).
- Personal history of atopic disorder.
- Family history of atopic disorder and/or asthma.
- Widespread wheeze heard on auscultation.
- History of improvement in symptoms or lung function in response to adequate therapy.

Acute asthma in children under 2 years

The assessment of acute asthma in early childhood can be difficult.

- Intermittent wheezing attacks are usually due to viral infection and the response to asthma medication is inconsistent.
- Prematurity and low birth weight are risk factors for recurrent wheezing.
- The differential diagnosis of symptoms includes: aspiration pneumonitis, pneumonia, bronchiolitis, tracheomalacia, complications of underlying conditions such as congenital anomalies and cystic fibrosis.

Classification of severity of acute presentation

Moderate asthma

Normal mental state

Ability to talk in sentences or vocalise as normal

Some accessory muscle use

PEF ≥ 50% of best or predicted

O_2 saturations > 92% in air

Moderate tachycardia

HR ≤ 125 min^{-1} (> 5 years)

HR ≤ 140 min^{-1} (2–5 years)

RR ≤ 30 min^{-1} (> 5 years)

RR ≤ 40 min^{-1} (2–5 years)

Management

Continuous O_2 saturation monitoring

High-flow O_2 via NRB mask titrated to achieve O_2 saturations 94–98%

ß2 agonist 2–10 puffs via pMDI + spacer

+/-face mask, repeat dose every 20 min reviewing effect; no improvement in 1 h treat as acute severe

Ipratropium bromide given early via pMDI

+ spacer +/- face mask, particularly if poorly responsive to ß2 agonist

Oral steroids: prednisolone
20 mg for children aged 2 to 5 years;
30 to 40 mg for children > 5 years

Acute severe asthma

Agitated, distressed

Can't complete sentences in one breath

Moderate to marked accessory muscle use

PEF 33–50% of best or predicted

O_2 saturations < 92% in air

HR > 125 min^{-1} (> 5 years)

HR > 140 min^{-1} (2–5 years)

RR > 30 min^{-1} (> 5 years)

RR > 40 min^{-1} (2–5 years)

Management

Continuous O_2 saturation monitoring

High-flow O_2 via NRB mask titrated to achieve O_2 saturations 94–98%

ß2 agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently

Oral steroids: 20 mg prednisolone for children aged 2 to 5 years;
30 to 40 mg for children > 5 years

Consider intravenous magnesium and aminophylline if if the child is unresponsive to maximal doses of bronchodilators and steroids

Consider ABG if poor response to early treatment

Refer to PICU

Life-threatening asthma

Confused, drowsy, exhausted

Unable to talk

Maximal accessory muscle use (poor respiratory effort is **pre-terminal)**

Marked tachycardia (sudden fall in HR is **pre-terminal)**

PEF < 33% of best or predicted

O_2 saturations < 92% in air

Silent chest

Cyanosis

Hypotension

Management

Continuous O_2 saturation monitoring

High-flow O_2 via NRB mask titrated to achieve O_2 saturations 94–98%

Refer to PICU

ß2 agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently

Oral steroids: 20 mg prednisolone (2–5 years); 30 to 40 mg (> 5 years). Repeat dose if vomiting or consider intravenous steroids (hydrocortisone 4 mg kg^{-1} every 4 h)

Give bolus of intravenous magnesium.

Consider early single bolus dose of IV salbutamol where child has responded poorly to inhaled therapy followed by an infusion

Consider aminophylline if child unresponsive to maximal doses of bronchodilators and steroids

Consider ABG if poor response to early treatment.

NRB – non-rebreather mask with reservoir

pMDI – pressurised metered-dose inhalers

Note: Evidence is unclear which of intravenous salbutamol, aminophylline or magnesium should be the first line in severe asthma.

Early management of asthma – September 2019. Based on the British Thoracic Society, Scottish Intercollegiate Guidelines Network, British guideline on the management of asthma revised 2019

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Treating convulsive status epilepticus in children

SEIZURE STARTS

Management

- Confirm clinically
- Check ABC, high-flow O_2, attach monitoring
- Check blood glucose, treat < 3 mmol L^{-1}

5 MIN

1st line agents

- Consider pre-hospital treatment already given: 2 doses of benzodiazepines max
- **Midazolam** 0.3–0.5 mg kg^{-1} bucally – see BNFc for exact age related dose

OR

- **Lorazepam** 0.1 mg kg^{-1} IV or IO

10–15 MIN

- **Lorazepam** 0.1 mg kg^{-1} IV
- Reconfirm epileptic seizure and prepare second-line agent of choice for next step

15–35 MIN

2nd line agents

- **Levetiracetam** 30–60 mg kg^{-1} (over 5 min, max 3 g)

OR

- **Phenytoin** 20 mg kg^{-1} by slow IV infusion over 20 min with ECG monitoring

OR

- **Phenobarbital** 20 mg kg^{-1} by IV infusion over 5 min

Call anaesthetist and PICU

20–40 MIN

2nd or 3rd line agents

- If preparation for deeper anaesthesia with intubation and ventilation complete, proceed to next step

OR

- Administer further alternative second-line drug (levetiracetam, phenytoin, phenobarbitol)

3rd line agents

- Rapid sequence induction of anaesthesia using thiopental sodium 4 mg kg^{-1} IV

OR

- Propofol 1–1.5 mg kg^{-1} IV (with single dose recuronium if using NMB); ketamine and midazolam alternatives
- Intubation and ventilation; monitoring neurological signs
- Ongoing seizures are not always easy to identify (EEG)

- Definition of convulsive status epilepticus (CSE) is a seizure that continues for greater than 5 min, so treatment usually starts once seizure has lasted > 5 min
- After 5 min seizures are unlikely to spontaneously terminate
- The risk of a seizure becoming refractory increases with increasing seizure duration.
- *ESETT/**ECLIPSE/***ConSEPT trials showed equal potency for phenytoin, levetiracetam and valproate
- Levetiracetam has a good safety profile and is easy to administer
- Children who frequently have seizures or CSE usually have an individually tailored guideline.
- Do not give phenytoin too rapidly as it will cause bradycardia and/or asystole.
- In sepsis consider measuring calcium and magnesium levels as they are sometimes low.
- Monitor glucose aim for 4-8 mmol L^{-1}
- Measure serum sodium and treat if < 125 mmol L^{-1} (3 mL kg^{-1} 3% sodium chloride)
- Consider temperature control measures if hyperthermic
- Consider meningitis, encephalitis and Raised ICP
- Consider CNS haemorrhage if signs of trauma
- There is no evidence for the ideal third line agent: thiopentone, propofol, ketamine and midazolam may all be used

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* Kapur et al. Randomized Trial of Three Anticonvulsant Medications for Status Epilepticus. N Engl J Med 2019;381:2103-2113.doi:10.1056/NEJMoa1905795

** Lyttle M, Pereira M et al. Levetiracetam versus phenytoin for second-line treatment of paediatric convulsive status epilepticus (EcLiPSE): a multicentre, open-label, randomised trial. Lancet, Volume 393, Issue 10186, 2125 – 2134

*** Dalziel SR, Borland ML et al; PREDICT research network. Levetiracetam versus phenytoin for second-line treatment of convulsive status epilepticus in children (Concept): an open-label, multicentre, randomised controlled trial. Lancet. 2019 May 25;393(10186):2135-2145

Early management of diabetic ketoacidosis (DKA) in children

adapted from NICE guidelines August 2015 (updated December 2020) NG18

Recognition

History of polyuria, polydipsia and weight loss.
May have confusion, abdominal pain and hyperventilation.

- Blood glucose > 11 mmol L^{-1}
- pH < 7.3
- Blood bicarbonate < 15 mmol L^{-1}
- Ketones: blood beta-hydroxybutyrate > 3 mmol L^{-1} or urine ketonuria ++ and above

Note: Usually not vomiting, acidotic or drowsy unless more than 5% dehydrated

Severity of DKA and degree of dehydration	
Mild: 5% dehydration	Venous pH 7.2–7.29 or Bicarbonate < 15 mmol L^{-1}
Moderate: 7% dehydration	Venous pH 7.1–7.19 or Bicarbonate < 10 mmol L^{-1}
Severe: 10% dehydration	Venous pH < 7.1 or Bicarbonate < 5 mmol L^{-1}

Management

Resuscitation

A ensure airway patency, insert NG tube if reduced conscious level or vomiting to decrease gastric distension

B 100% oxygen via a face mask with reservoir bag + titrate to oxygen saturations 94-98%; avoid intubation unless respiratory arrest or respiratory failure when anaesthetic assistance urgently required

C establish IV access, take venous bloods (pH, $PaCO_2$, bicarbonate, sodium, potassium, urea, creatinine, beta-hydroxybutyrate levels, glucose), monitor ECG, identify shock

- Give a fluid bolus 10 mL kg^{-1} of balanced isotonic crystalloid or 0.9% sodium chloride over 60 min to children with NO shock
- Give a fluid bolus 10 mL kg^{-1} of balanced isotonic crystalloid or 0.9% sodium chloride over 5–10 min and re-assess; repeat to a maximum of 40 mL kg^{-1}; inform PICU if shock is persists

D seek and identify signs and symptoms of raised intracranial pressure – headache, confusion, irritability, posturing, falling GCS, rising BP with bradycardia. Treat with 3% sodium chloride or mannitol, seek PICU advice and call an anaesthetist. Consider CT brain to determine the cause.

E Consider sepsis if fever, hypothermia, hypotension, lactic acidosis, refractory acidosis

Intravenous therapy: fluids and insulin

For children with dehydration, nausea and vomiting:

Calculate fluid requirements (FR) for each child

Aim: to correct fluid deficit over 48 h

FR = Maintenance fluids for 48 h + fluid deficit

Subtract 10 mL kg^{-1} from fluid requirement for children who did not present with shock

Do not subtract resuscitation fluid volumes from fluid requirements for children who presented in shock

Isotonic balanced crystalloids or 0.9% sodium chloride initial fluid of choice - add potassium once passing urine. Add 5% dextrose to fluid when glucose less than 14 mmol L^{-1}

1–2 h after intravenous fluids commenced, start insulin infusion at 0.05–0.1 units kg^{-1} h^{-1}

Monitor serum potassium and treat hypokalaemia

Do not give intravenous bicarbonate to correct acidosis

Observations

Strict fluid balance

Hourly capillary blood gas and blood glucose measurements

Capillary blood ketone levels 1–2 h (ideally point of care testing)

Initially two-hourly U+E's

Hourly BP, HR, RR, temperature

Hourly assessment of level of consciousness

Half hourly neuro observations including level of consciousness in children with severe DKA and children < 2 years old.

Urgently escalate symptoms of headache, bradycardia, changes in level of consciousness or changes in ECG (ST and T wave changes may indicate hypokalaemia)

Maintenance fluids calculation
4 mL kg^{-1} h^{-1} for first 10 kg of body weight
2 mL kg^{-1} h^{-1} for second 10 kg of body weight (11–20 kg)
1 mL kg^{-1} h^{-1} for each kg of body weight above 20 kg (up to max of 80 kg)

Fluid deficit (mL) = % dehydration x weight (kg) x 10	
Fluid requirement (FR) over 48 h 10 kg child	Example: 5% dehydrated, no shock at presentation, given 10 mL kg^{-1} 0.9% saline
= Maintenance requirement for 48 h + (fluid deficit – initial fluid given) (if no shock)	= (10 x 4 x 48) + [(5 x 10 x 10) – (10 x 10)] = 2320 mL over 48 h = 48.3 mL h^{-1}

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Septic shock and sepsis-associated organ dysfunction in children

RECOGNITION

Assess with ABCDE approach

A, B assessment

- Airway, RR, work of breathing, oxygen saturations, breath sounds, recognition respiratory distress/failure.
- Open airway and start high-flow oxygen via non-rebreather mask with reservoir or BMV as appropriate.

C assessment

- HR, CRT, BP, peripheral and central perfusion, rhythm recognition; recognition circulatory failure/shock.
- Establish IV/IO access (take blood cultures, full blood count, blood glucose, urea and electrolytes, lactate*, blood gas and other bloods as indicated**) and give fluid resuscitation as below.

D assessment

- AVPU score; recognition of altered mental status secondary to poor perfusion.

E assessment

- Rash, temperature (high or low).

Sepsis is diagnosed if there is evidence of infection as cause of the acute illness (suspected or proven) plus at least two of the following: core temperature < 36°C or > 38.5°C; white cell count elevated or depressed for age; inappropriate tachycardia; altered mental state; reduced peripheral perfusion.

↓

10–15 MIN

Initial resuscitation

- If no signs fluid overload (hepatomegaly, crackles at lung bases) then give 10 mL kg^{-1} balanced crystalloids*** IV bolus over 5–10 min and re-assess after each bolus up to 40–60 mL kg^{-1} or until perfusion improved.
- Therapeutic end points: CRT < 2 s; normal BP for age; UO > 1 mL kg^{-1} h^{-1}, normal pulses, normal mental state.
- Watch for signs of fluid overload; if present stop bolus therapy and start inotropic support.
- Correct hypoglycaemia and hypocalcaemia.
- Start broad-spectrum antibiotics; seek and aggressively control any infection source.
- Call for more senior help and an anaesthetist urgently; call PICU for bed +/- PICU transfer team.
- If mechanical ventilation is required, then cardiovascular instability during intubation is less likely after appropriate cardiovascular resuscitation.

↓

15–60 MIN

Fluid refractory shock?

Start IV/IO inotrope infusion; central (preferable) or peripheral IV (clinical signs unreliable at differentiating 'warm' and 'cold' shock in children).

Adrenaline 0.05–0.3 mcg kg^{-1} min^{-1} (use more dilute infusion if peripheral)

and/or

Noradrenaline via central IV or IO, starting infusion rate 0.05 mcg kg^{-1} min^{-1}

Titrate inotropes upwards according to clinical response and haemodynamic effects using haemodynamic monitoring (where possible)****

Use ketamine +/- atropine IV/IO/IM to gain central access and airway if needed.

↓

Fluid and catecholamine-resistant shock?

Further management as per Paediatric Intensive Care/retrieval service advice.

Warm shock – high cardiac output with low systemic vascular resistance.	**Cold shock** – low cardiac output with high systemic vascular resistance.	**Fluid in mL kg^{-1} should be dosed for ideal body weight (max bolus 500 mL)**

* lactate measurements are useful if available as they have prognostic ability if measured serially.

** Other bloods that may be indicated: coagulation studies, liver function tests, magnesium levels or any others indicated by the child's clinical picture.

*** Balanced (buffered) fluids are used in preference to 0.9% sodium chloride, but if not available, 0.9% sodium chloride should be used.

**** These are starting dose ranges for these inotropes, and increases may be necessary but should be guided by PICU retrieval team/senior clinicians. Choice of inotropes is dictated by clinician preference, response to treatment and monitored parameters, and again decisions should be made in conjunction with PICU teams.

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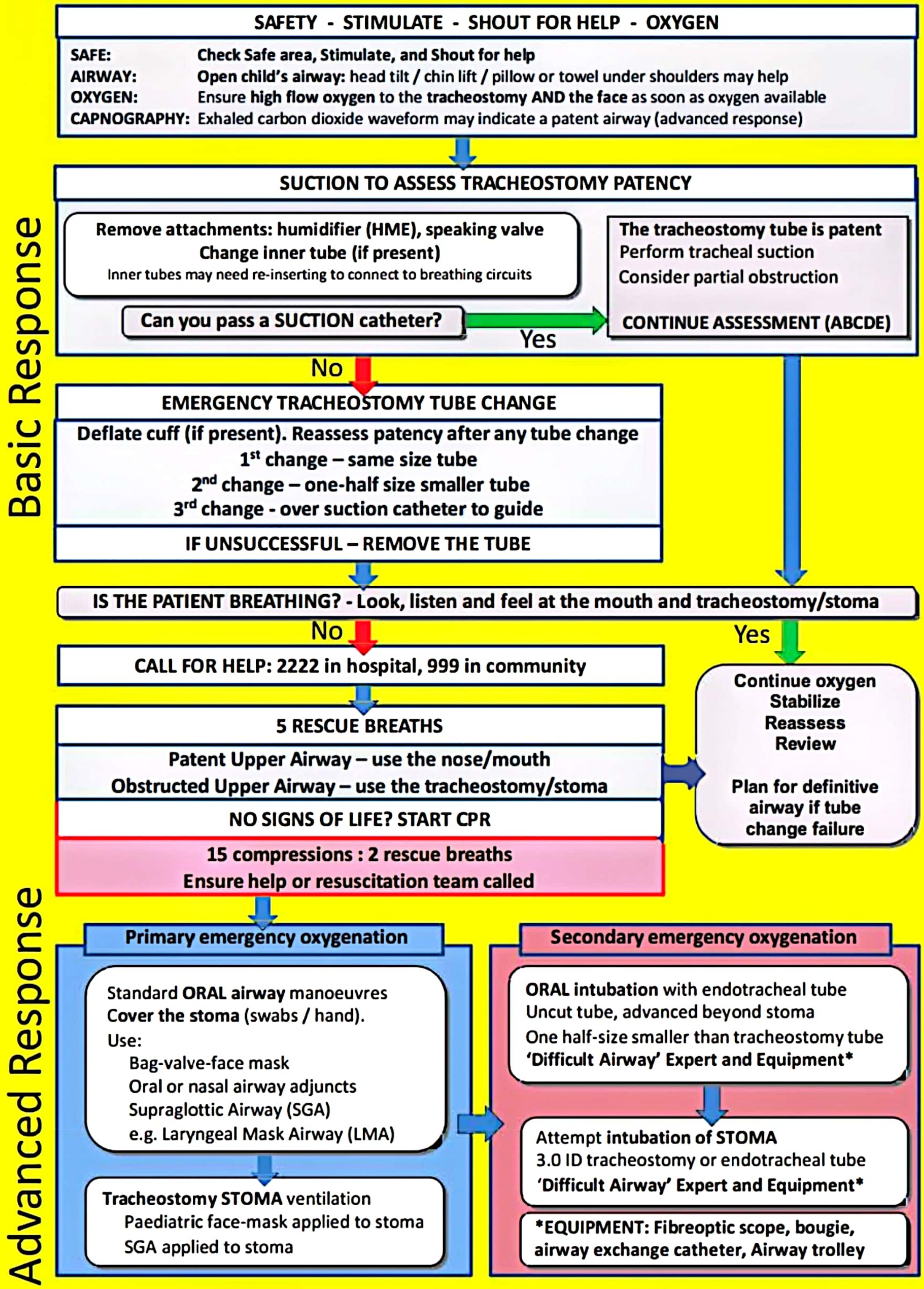
Resuscitation Council UK

GUIDELINES 2021

Emergency Paediatric Tracheostomy Management



SAFETY - STIMULATE - SHOUT FOR HELP - OXYGEN

SAFE: Check Safe area, Stimulate, and Shout for help

AIRWAY: **Open child's airway:** head tilt / chin lift / pillow or towel under shoulders may help

OXYGEN: Ensure **high flow oxygen to the tracheostomy AND the face** as soon as oxygen available

CAPNOGRAPHY: Exhaled carbon dioxide waveform may indicate a patent airway (advanced response)

SUCTION TO ASSESS TRACHEOSTOMY PATENCY

Remove attachments: humidifier (HME), speaking valve
Change inner tube (if present)
Inner tubes may need re-inserting to connect to breathing circuits

Can you pass a SUCTION catheter?

Yes

The tracheostomy tube is patent
Perform tracheal suction
Consider partial obstruction

CONTINUE ASSESSMENT (ABCDE)

No

EMERGENCY TRACHEOSTOMY TUBE CHANGE

Deflate cuff (if present). Reassess patency after any tube change
1st change – same size tube
2nd change – one-half size smaller tube
3rd change - over suction catheter to guide

IF UNSUCCESSFUL – REMOVE THE TUBE

IS THE PATIENT BREATHING? - Look, listen and feel at the mouth and tracheostomy/stoma

No

CALL FOR HELP: 2222 in hospital, 999 in community

5 RESCUE BREATHS

Patent Upper Airway – use the nose/mouth
Obstructed Upper Airway – use the tracheostomy/stoma

NO SIGNS OF LIFE? START CPR

15 compressions : 2 rescue breaths
Ensure help or resuscitation team called

Yes

Continue oxygen
Stabilize
Reassess
Review

Plan for definitive airway if tube change failure

Primary emergency oxygenation

Standard **ORAL airway** manoeuvres
Cover the stoma (swabs / hand).
Use:
- Bag-valve-face mask
- Oral or nasal airway adjuncts
- Supraglottic Airway (SGA)
- e.g. Laryngeal Mask Airway (LMA)

Tracheostomy STOMA ventilation
- Paediatric face-mask applied to stoma
- SGA applied to stoma

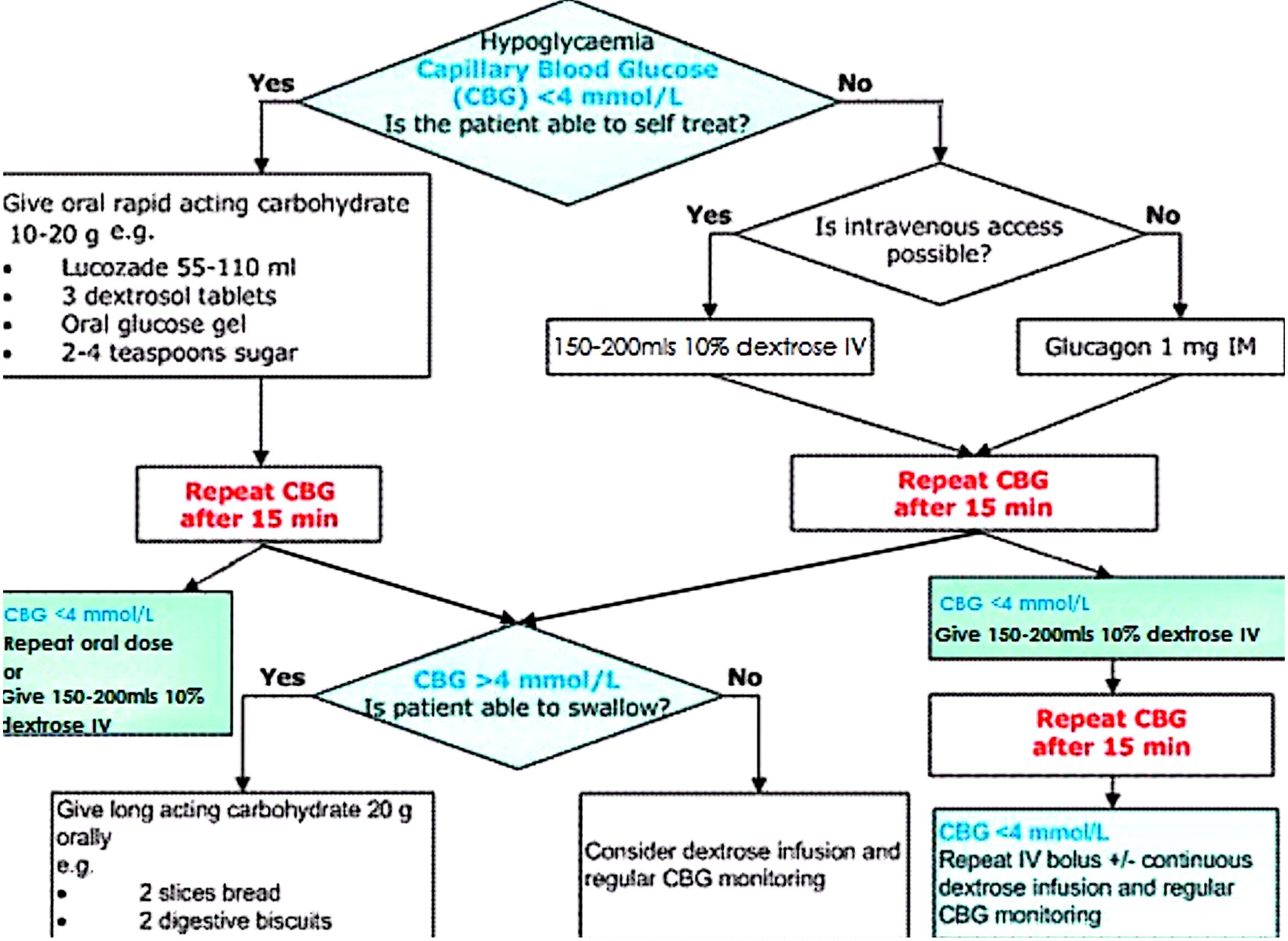
Secondary emergency oxygenation

ORAL intubation with endotracheal tube
Uncut tube, advanced beyond stoma
One half-size smaller than tracheostomy tube
'Difficult Airway' Expert and Equipment*

Attempt intubation of STOMA
3.0 ID tracheostomy or endotracheal tube
'Difficult Airway' Expert and Equipment*

***EQUIPMENT: Fibreoptic scope, bougie, airway exchange catheter, Airway trolley**

NTSP (Paediatric Working Group) www.tracheostomy.org.uk Review January 2022


Hypoglycaemia
Capillary Blood Glucose (CBG) <4 mmol/L
Is the patient able to self treat?
Yes
No
Give oral rapid acting carbohydrate 10-20 g e.g.
• Lucozade 55-110 ml
• 3 dextrosol tablets
• Oral glucose gel
• 2-4 teaspoons sugar
Yes
Is intravenous access possible?
No
150-200mls 10% dextrose IV
Glucagon 1 mg IM
Repeat CBG after 15 min
Repeat CBG after 15 min
CBG <4 mmol/L
Repeat oral dose
or
Give 150-200mls 10% dextrose IV
CBG <4 mmol/L
Give 150-200mls 10% dextrose IV
Yes
CBG >4 mmol/L
Is patient able to swallow?
No
Repeat CBG after 15 min
Give long acting carbohydrate 20 g orally
e.g.
• 2 slices bread
• 2 digestive biscuits
Consider dextrose infusion and regular CBG monitoring
CBG <4 mmol/L
Repeat IV bolus +/- continuous dextrose infusion and regular CBG monitoring

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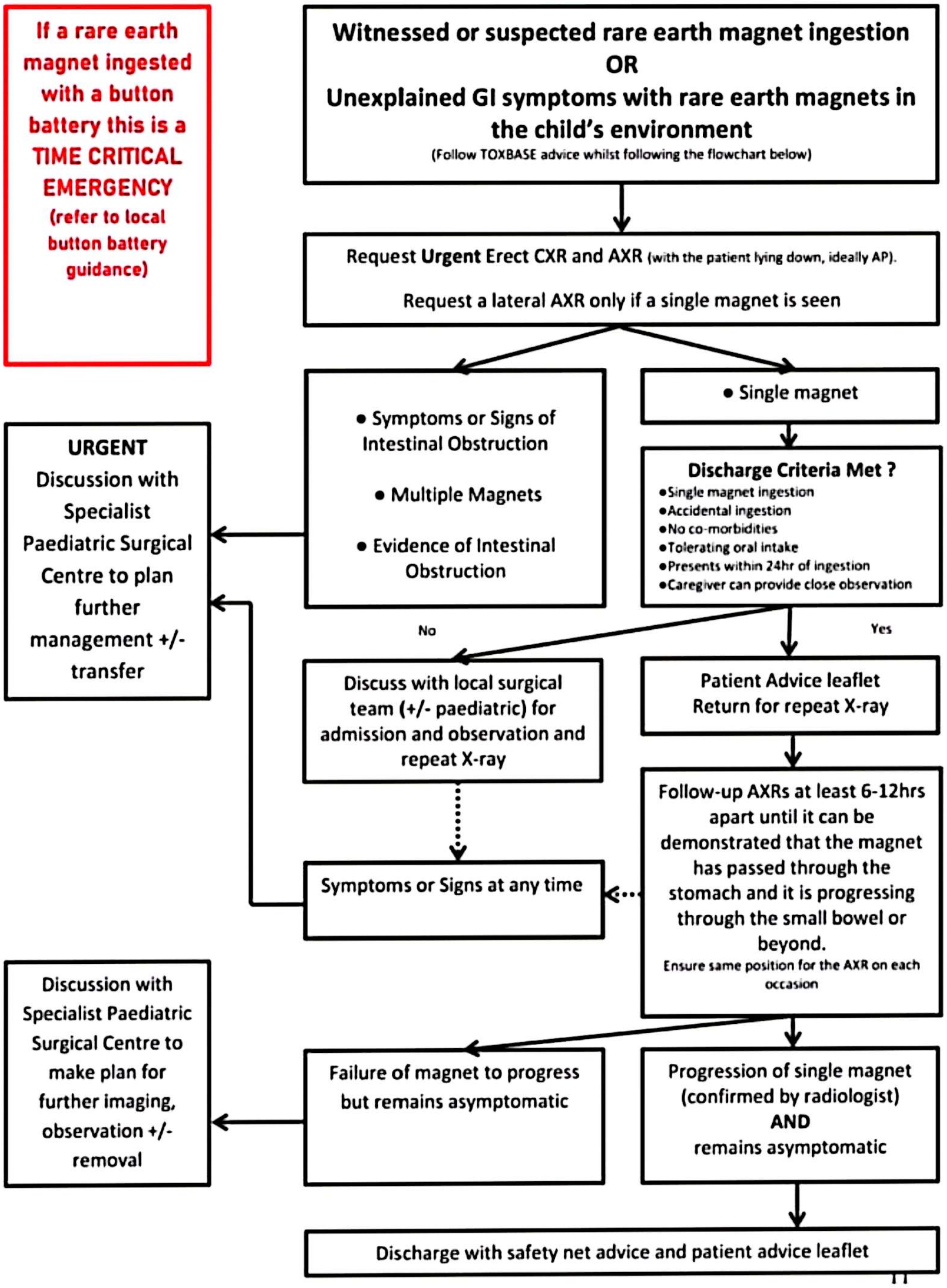
Appendix 2- Management Algorithm



If a rare earth magnet ingested with a button battery this is a TIME CRITICAL EMERGENCY (refer to local button battery guidance)

Witnessed or suspected rare earth magnet ingestion
OR
Unexplained GI symptoms with rare earth magnets in the child's environment
(Follow TOXBASE advice whilst following the flowchart below)

Request **Urgent** Erect CXR and AXR (with the patient lying down, ideally AP).

Request a lateral AXR only if a single magnet is seen

- Symptoms or Signs of Intestinal Obstruction
- Multiple Magnets
- Evidence of Intestinal Obstruction

URGENT Discussion with Specialist Paediatric Surgical Centre to plan further management +/- transfer

- Single magnet

Discharge Criteria Met ?

- Single magnet ingestion
- Accidental ingestion
- No co-morbidities
- Tolerating oral intake
- Presents within 24hr of ingestion
- Caregiver can provide close observation

Discuss with local surgical team (+/- paediatric) for admission and observation and repeat X-ray

Patient Advice leaflet
Return for repeat X-ray

Symptoms or Signs at any time

Follow-up AXRs at least 6-12hrs apart until it can be demonstrated that the magnet has passed through the stomach and it is progressing through the small bowel or beyond.
Ensure same position for the AXR on each occasion

Discussion with Specialist Paediatric Surgical Centre to make plan for further imaging, observation +/- removal

Failure of magnet to progress but remains asymptomatic

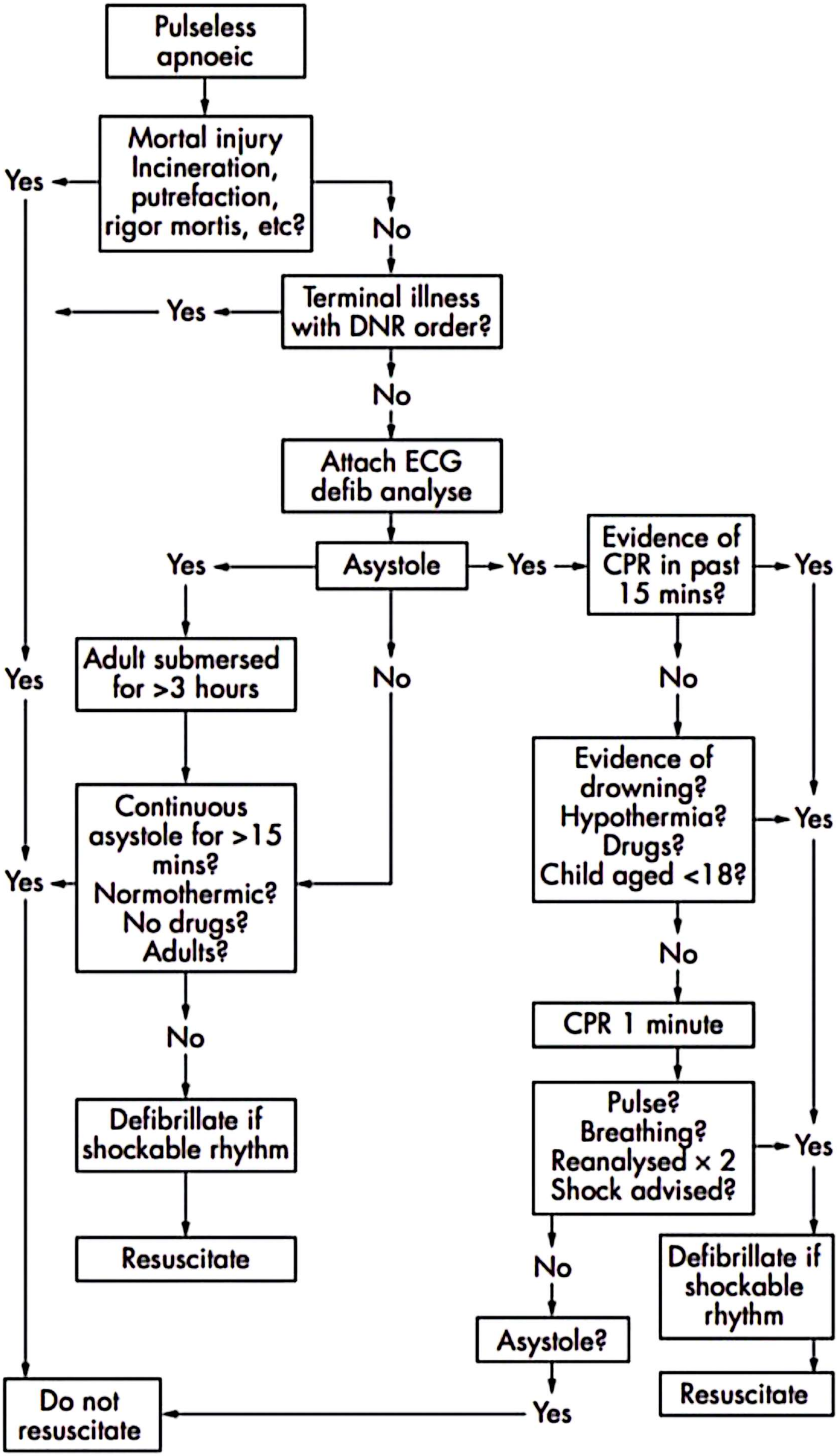
Progression of single magnet (confirmed by radiologist)
AND
remains asymptomatic

Discharge with safety net advice and patient advice leaflet

	ECG changes / symptomatic	No ECG changes / asymptomatic	No ECG changes / asymptomatic
Neonate	K+ >7.6mmol/L	K+ 7.1-7.5mmol/L	K+ 6.5-7mmol/L
> 1 month to < 14yrs	K+ >7.1mmol/L	K+ 6.1-7mmol/L	K+ 5.5-6mmol/L
>14yrs	K+ >7.1mmol/L	K+ 6.1-7mmol/L	K+ 5.5-6mmol/L

Management

ECG changes / symptomatic	No ECG changes / asymptomatic	No ECG changes / asymptomatic
• **Give IV calcium** (stabilises the cardiac membrane). • **Neonate** • Calcium Gluconate 10% 0.5ml/kg over 10 minutes Give centrally whenever possible. • If no central access available, dilute x 5 volume with Sodium Chloride 0.9%. • **>1 month to <14yrs** • Calcium Gluconate 10% 0.5ml/kg over 10 minutes (max 20ml) diluted to 50ml with Sodium Chloride 0.9% • **>14yrs** • Calcium Gluconate 10% 20ml over 10 minutes • **Nebulised Salbutamol (moves K + into cells)** • **Neonate** • 2.5mg diluted to 2ml with Sodium Chloride 0.9% • **>1 month to <14years** • 2.5mg for < 10kg 5mg for ≥ 10kg • **>14 10mg :** • 10mg • **Give Insulin/Glucose (moves K + into cells)** Monitor blood glucose every 30 mins for 6 hours. • **Neonate, >1 month to <14years** • **Add 0.1units/kg** soluble insulin (actrapid) to 1g/kg of glucose. Give over 10 minutes. • **>14 years:** • Add 10 units of soluble Insulin (actrapid) to 50ml Glucose 50% or 125ml glucose 20% .Give over 5- 10 minutes. • **Sodium bicarbonate Used to counteract serum potassium leak from cells in acidosis (blood pH < 7.34)** • Onset of action 10 - 30 minutes, duration up to 2 hours. • Dose: Intravenous: 1-2 mmol/kg over 30 minutes (1-2 mL/kg of 8.4% or 2-4 ml/kg of 4.2%) Maximum 50 mL • **Increases K+ elimination** • **IV Furosemide** • **Neonate -** 1mg/kg/dose over 5 mins • **>1 month to <14years -** 1mg/kg/dose (max 20 mg) over 5 mins • **>14 years -** 20mg over 5 mins • **Calcium Resonium** • **Neonate -** Rectally 125-250mg/kg/dose four times a day	• **Nebulised Salbutamol (moves K + into cells)** • **Neonate** • 2.5mg diluted to 2ml with Sodium Chloride 0.9% • **>1 month to <14years** • 2.5mg for < 10kg 5mg for ≥ 10kg • **>14 10mg :** • 10mg • **Give Insulin/Glucose (moves K + into cells)** Monitor blood glucose every 30 mins for 6 hours. • **Neonate, >1 month to <14years** • **Add 0.1units/kg** soluble insulin (actrapid) to 1g/kg of glucose. Give over 10 minutes. • **>14 years:** • Add 10 units of soluble Insulin (actrapid) to 50ml Glucose 50% or 125ml glucose 20% .Give over 5- 10 minutes. • **Sodium bicarbonate Used to counteract serum potassium leak from cells in acidosis (blood pH < 7.34)** • Onset of action 10 - 30 minutes, duration up to 2 hours. • Dose: Intravenous: 1-2 mmol/kg over 30 minutes (1-2 mL/kg of 8.4% or 2-4 ml/kg of 4.2%) Maximum 50 mL • **Increases K+ elimination** • **IV Furosemide** • **Neonate -** 1mg/kg/dose over 5 mins • **>1 month to <14years -** 1mg/kg/dose (max 20 mg) over 5 mins • **>14 years -** 20mg over 5 mins • **Calcium Resonium** • **Neonate -** Rectally 125-250mg/kg/dose four times a day • **>1 month to <14years -** Oral/rectally 125-250mg/kg/dose four times day • **>14 years -** Oral/rectally 15 grams four times a day	• **Nebulised Salbutamol (moves K + into cells)** • **Neonate** • 2.5mg diluted to 2ml with Sodium Chloride 0.9% • **>1 month to <14years** • 2.5mg for < 10kg 5mg for ≥ 10kg • **>14 10mg :** • 10mg • **Increases K+ elimination** • **IV Furosemide** • **Neonate -** 1mg/kg/dose over 5 mins • **>1 month to <14years -** 1mg/kg/dos (max 20 mg) over 5 mins • **>14 years -** 20mg over 5 mins • **Calcium Resonium** • **Neonate -** Rectally 125-250mg/kg/dose four times a day • **>1 month to <14years -** Oral/rectally 125-250mg/kg/dose four times day • **>14 years -** Oral/rectally 15 grams four times a day


Pulseless apnoeic
Mortal injury Incineration, putrefaction, rigor mortis, etc?
Yes
No
Terminal illness with DNR order?
Yes
No
Attach ECG defib analyse
Asystole
Yes
Yes
Evidence of CPR in past 15 mins?
Yes
Adult submersed for >3 hours
Yes
No
No
Continuous asystole for >15 mins? Normothermic? No drugs? Adults?
Yes
Evidence of drowning? Hypothermia? Drugs? Child aged <18?
Yes
No
No
CPR 1 minute
Defibrillate if shockable rhythm
Pulse? Breathing? Reanalysed × 2 Shock advised?
Yes
Resuscitate
No
Defibrillate if shockable rhythm
Asystole?
Do not resuscitate
Yes
Resuscitate

- **First aid measure**
- **Sit with their upper body** tilted forward and their mouth open.
- **Pinch the cartilaginous** (soft) part of the nose firmly and hold it for **10–15** minutes

- **Bleeding stops with first aid measures?**

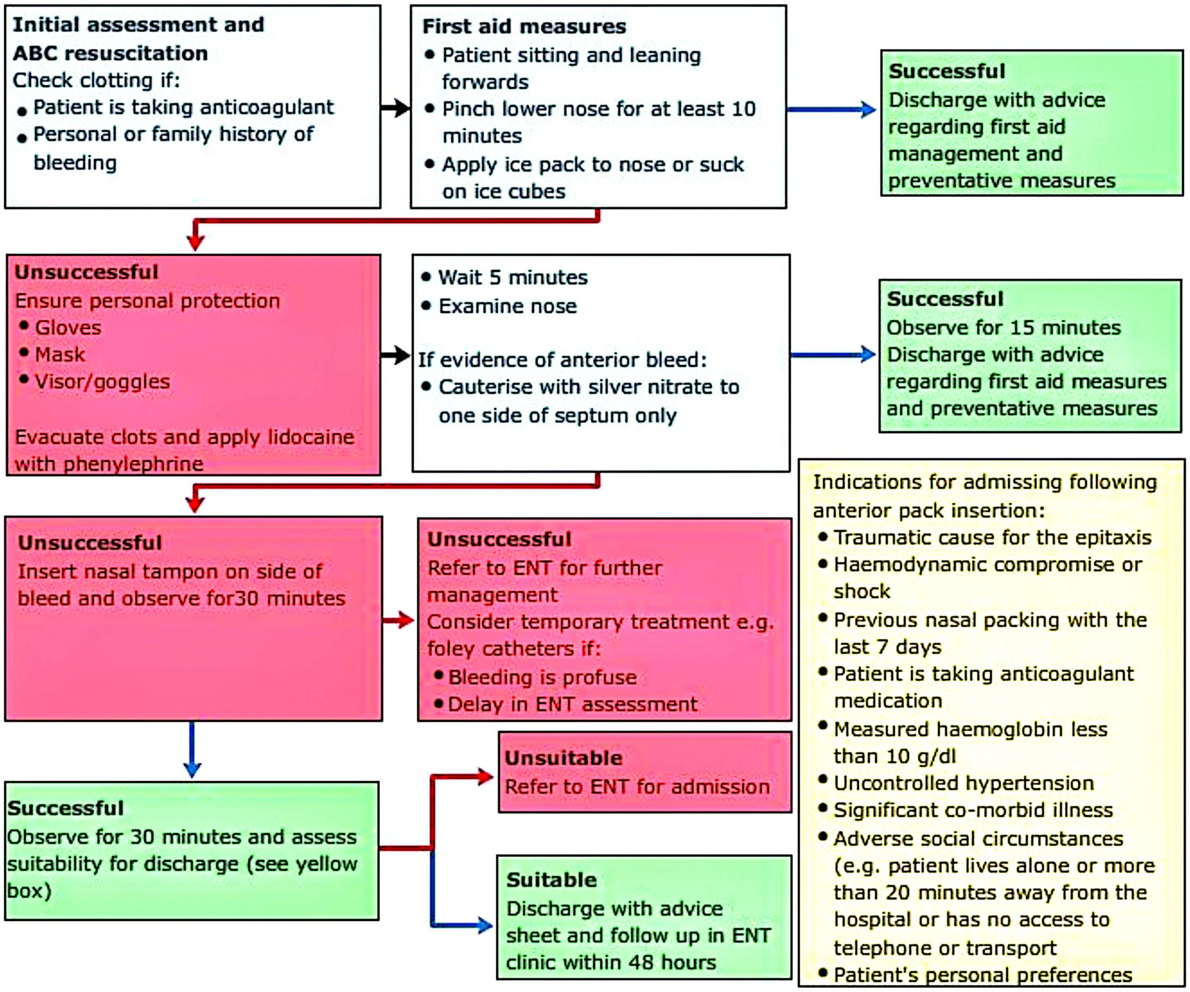
Yes

- **Consider applying a topical antiseptic preparation**
- prescribe **Naseptin®** (chlorhexidine and neomycin)
- If patient allergic to naseptin then prescribe **mupirocin nasal ointment**

No

- **If first aid measure fails then consider:**
- **Nasal cautery -** if the bleeding point can be seen and the procedure can be tolerated (eg in adults and older children)
- **Nasal packing** — if nasal cautery is ineffective or the bleeding point cannot be seen.

- **Epistaxis resolved**
- Offer selfcare advise
- Offer topical antiseptic preparation (as mentioned above)
- Arrange follow-up



Initial assessment and ABC resuscitation

Check clotting if:

- Patient is taking anticoagulant
- Personal or family history of bleeding

First aid measures

- Patient sitting and leaning forwards
- Pinch lower nose for at least 10 minutes
- Apply ice pack to nose or suck on ice cubes

Successful

Discharge with advice regarding first aid management and preventative measures

Unsuccessful

Ensure personal protection

- Gloves
- Mask
- Visor/goggles

Evacuate clots and apply lidocaine with phenylephrine

- Wait 5 minutes
- Examine nose

If evidence of anterior bleed:

- Cauterise with silver nitrate to one side of septum only

Successful

Observe for 15 minutes

Discharge with advice regarding first aid measures and preventative measures

Unsuccessful

Insert nasal tampon on side of bleed and observe for30 minutes

Unsuccessful

Refer to ENT for further management

Consider temporary treatment e.g. foley catheters if:

- Bleeding is profuse
- Delay in ENT assessment

Successful

Observe for 30 minutes and assess suitability for discharge (see yellow box)

Unsuitable

Refer to ENT for admission

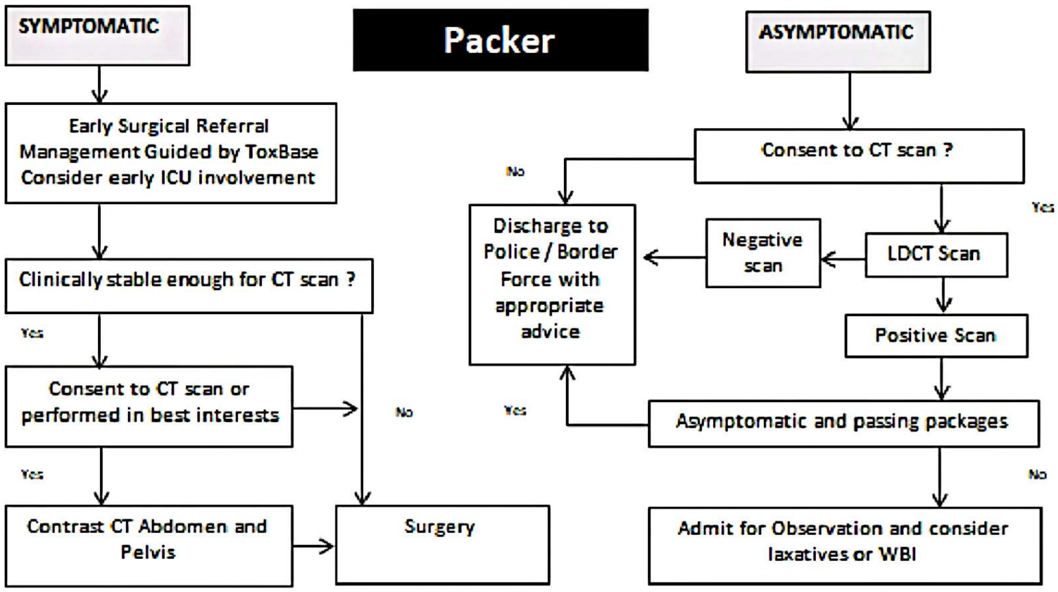
Suitable

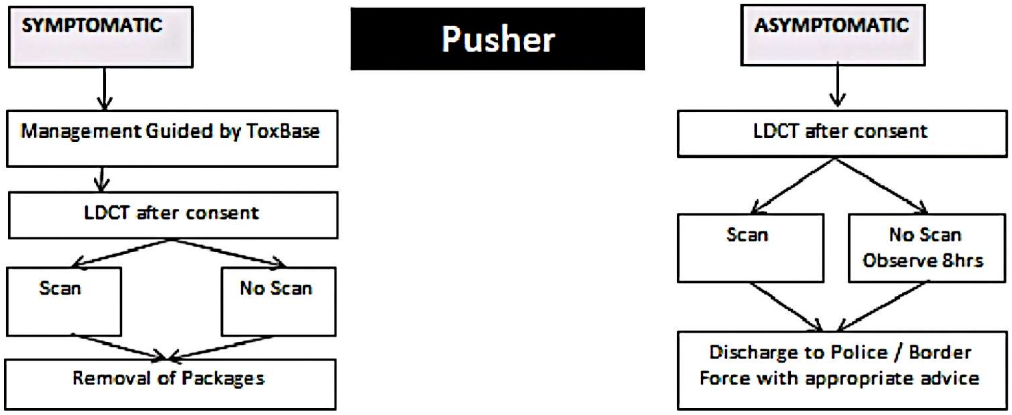
Discharge with advice sheet and follow up in ENT clinic within 48 hours

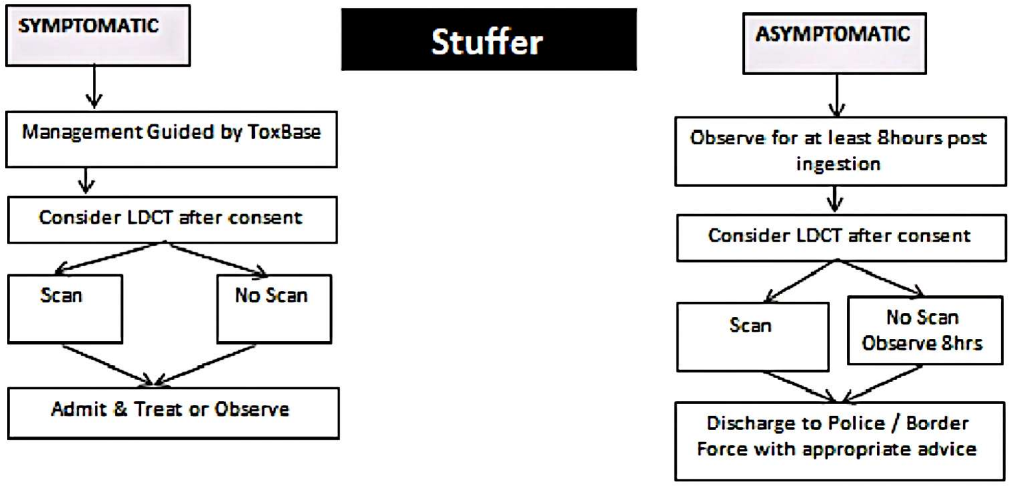
Indications for admissing following anterior pack insertion:

- Traumatic cause for the epitaxis
- Haemodynamic compromise or shock
- Previous nasal packing with the last 7 days
- Patient is taking anticoagulant medication
- Measured haemoglobin less than 10 g/dl
- Uncontrolled hypertension
- Significant co-morbid illness
- Adverse social circumstances (e.g. patient lives alone or more than 20 minutes away from the hospital or has no access to telephone or transport
- Patient's personal preferences

Appendix 1: Algorithm for suspected internal drug traffickers (SIDT)

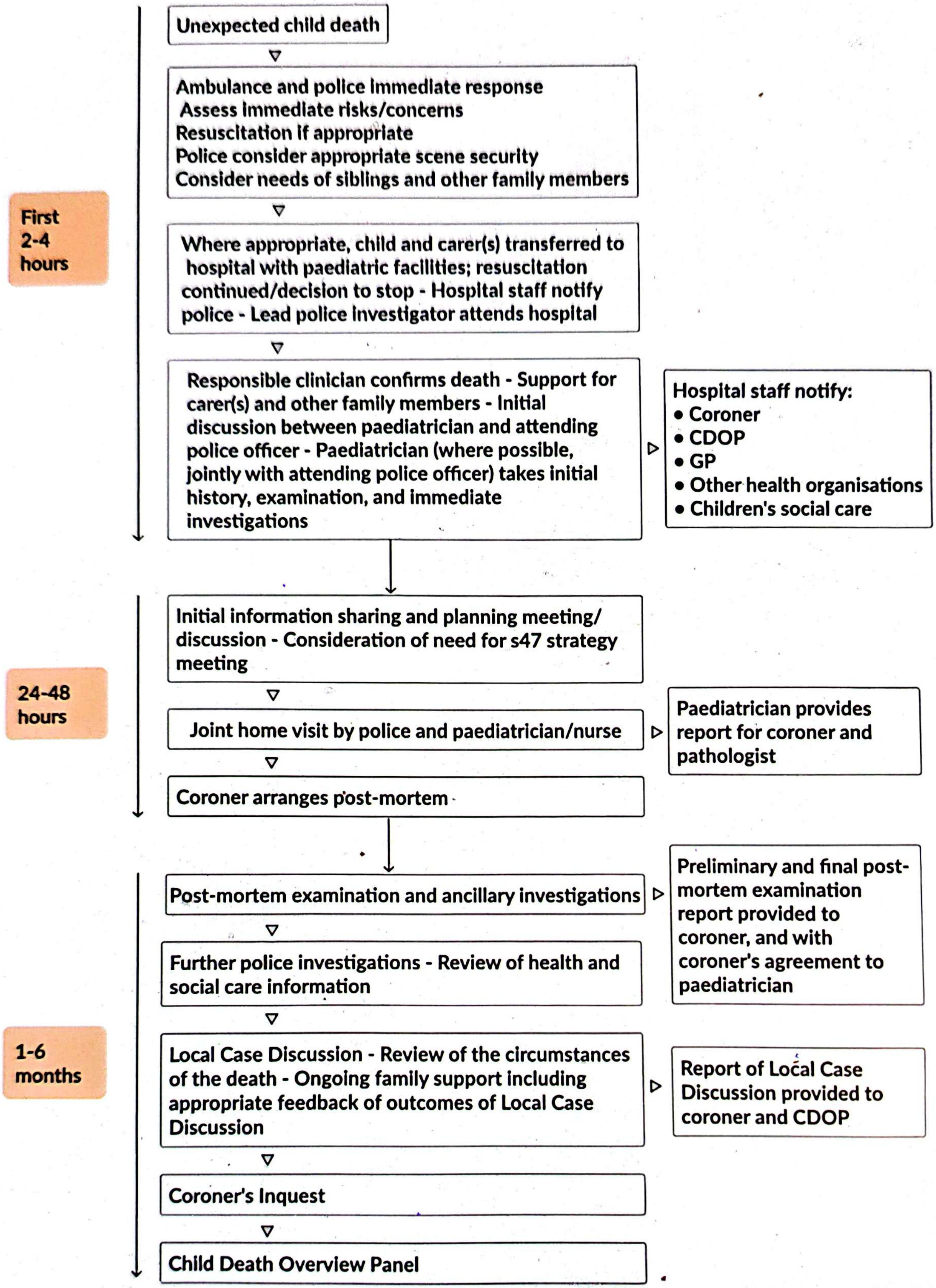

SYMPTOMATIC
Packer
ASYMPTOMATIC
Early Surgical Referral Management Guided by ToxBase Consider early ICU involvement
Consent to CT scan ?
No
Yes
Discharge to Police / Border Force with appropriate advice
Negative scan
LDCT Scan
Clinically stable enough for CT scan ?
Positive Scan
Yes
Consent to CT scan or performed in best interests
No
Yes
Asymptomatic and passing packages
Yes
No
Contrast CT Abdomen and Pelvis
Surgery
Admit for Observation and consider laxatives or WBI


SYMPTOMATIC
Pusher
ASYMPTOMATIC
Management Guided by ToxBase
LDCT after consent
LDCT after consent
Scan
No Scan Observe 8hrs
Scan
No Scan
Removal of Packages
Discharge to Police / Border Force with appropriate advice


SYMPTOMATIC
Stuffer
ASYMPTOMATIC
Management Guided by ToxBase
Observe for at least 8hours post ingestion
Consider LDCT after consent
Consider LDCT after consent
Scan
No Scan
Scan
No Scan Observe 8hrs
Admit & Treat or Observe
Discharge to Police / Border Force with appropriate advice

The joint agency response to an unexpected infant death

From Working Together, 2015 2



First 2-4 hours

Unexpected child death

Ambulance and police immediate response
Assess immediate risks/concerns
Resuscitation if appropriate
Police consider appropriate scene security
Consider needs of siblings and other family members

Where appropriate, child and carer(s) transferred to hospital with paediatric facilities; resuscitation continued/decision to stop - Hospital staff notify police - Lead police investigator attends hospital

Responsible clinician confirms death - Support for carer(s) and other family members - Initial discussion between paediatrician and attending police officer - Paediatrician (where possible, jointly with attending police officer) takes initial history, examination, and immediate investigations

Hospital staff notify:

- Coroner
- CDOP
- GP
- Other health organisations
- Children's social care

24-48 hours

Initial information sharing and planning meeting/ discussion - Consideration of need for s47 strategy meeting

Joint home visit by police and paediatrician/nurse

Paediatrician provides report for coroner and pathologist

Coroner arranges post-mortem

1-6 months

Post-mortem examination and ancillary investigations

Preliminary and final post-mortem examination report provided to coroner, and with coroner's agreement to paediatrician

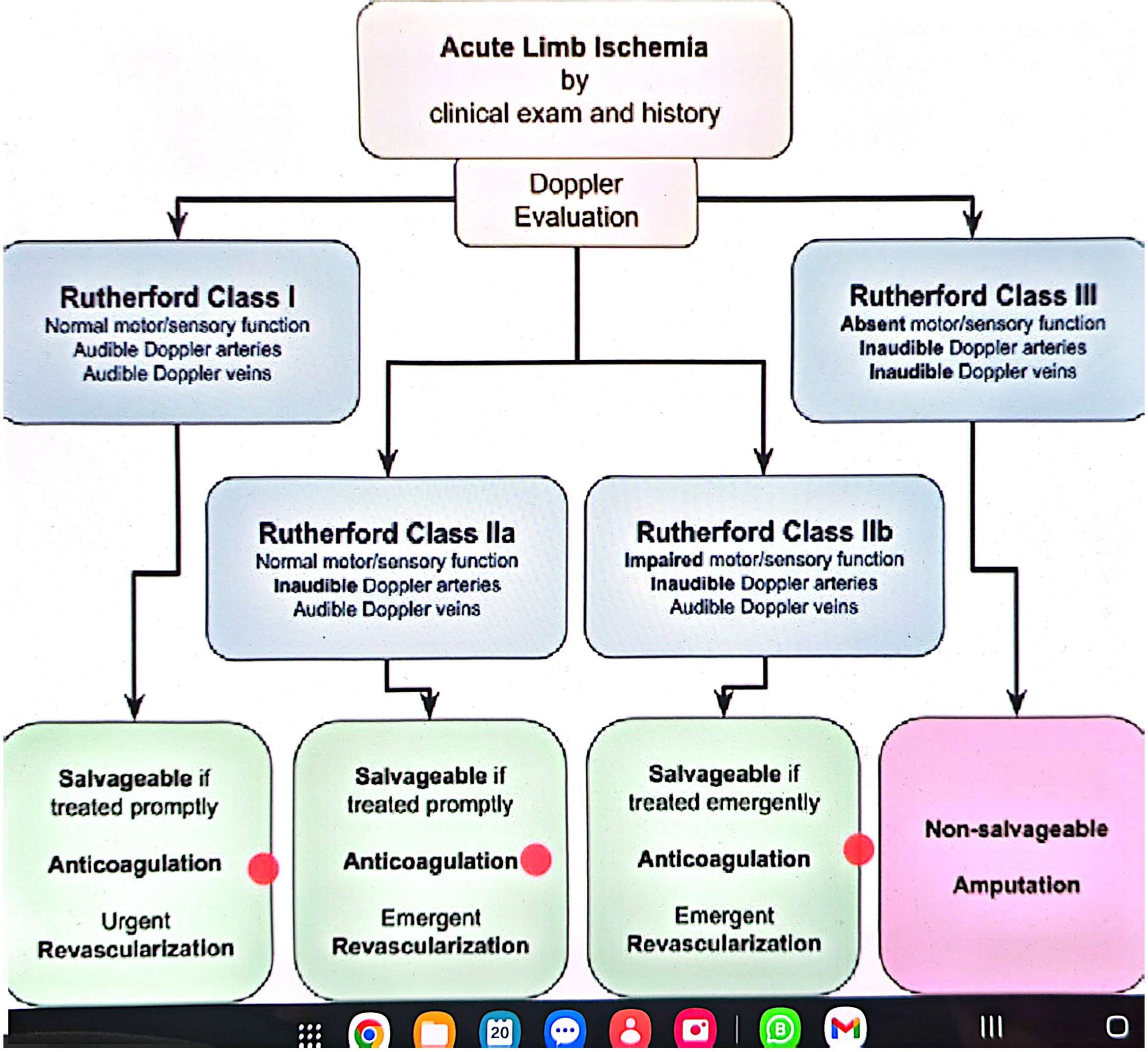
Further police investigations - Review of health and social care information

Local Case Discussion - Review of the circumstances of the death - Ongoing family support including appropriate feedback of outcomes of Local Case Discussion

Report of Local Case Discussion provided to coroner and CDOP

Coroner's Inquest

Child Death Overview Panel



Acute Limb Ischemia
by
clinical exam and history

Doppler
Evaluation

Rutherford Class I
Normal motor/sensory function
Audible Doppler arteries
Audible Doppler veins

Rutherford Class IIa
Normal motor/sensory function
Inaudible Doppler arteries
Audible Doppler veins

Rutherford Class IIb
Impaired motor/sensory function
Inaudible Doppler arteries
Audible Doppler veins

Rutherford Class III
Absent motor/sensory function
Inaudible Doppler arteries
Inaudible Doppler veins

Salvageable if
treated promptly

Anticoagulation

Urgent
Revascularization

Salvageable if
treated promptly

Anticoagulation

Emergent
Revascularization

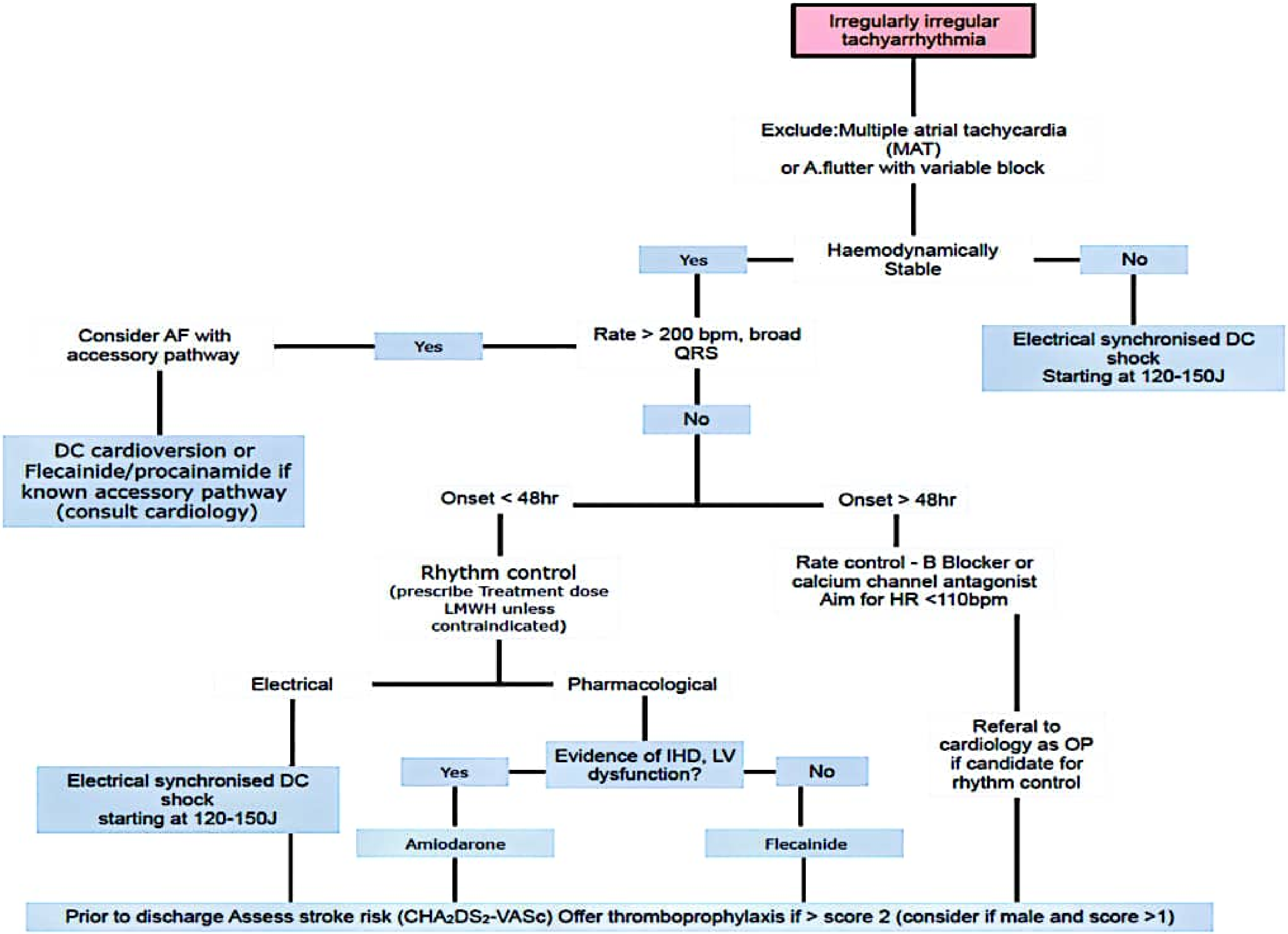
Salvageable if
treated emergently

Anticoagulation

Emergent
Revascularization

Non-salvageable

Amputation


Irregularly irregular tachyarrhythmia
Exclude:Multiple atrial tachycardia (MAT) or A.flutter with variable block
Haemodynamically Stable
Yes
No
Electrical synchronised DC shock Starting at 120-150J
Rate > 200 bpm, broad QRS
Yes
Consider AF with accessory pathway
DC cardioversion or Flecainide/procainamide if known accessory pathway (consult cardiology)
No
Onset < 48hr
Onset > 48hr
Rhythm control (prescribe Treatment dose LMWH unless contraindicated)
Rate control - B Blocker or calcium channel antagonist Aim for HR <110bpm
Electrical
Pharmacological
Electrical synchronised DC shock starting at 120-150J
Evidence of IHD, LV dysfunction?
Yes
No
Amiodarone
Flecainide
Referal to cardiology as OP if candidate for rhythm control
Prior to discharge Assess stroke risk (CHA$_2$DS$_2$-VASc) Offer thromboprophylaxis if > score 2 (consider if male and score >1)